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This Week in The IRON AGE

Vol. 155, No. 24 June 14, 1945

Editorial

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Technical Articles

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Features

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News and Markets

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Get Ryerson Help on Allegheny Stainless

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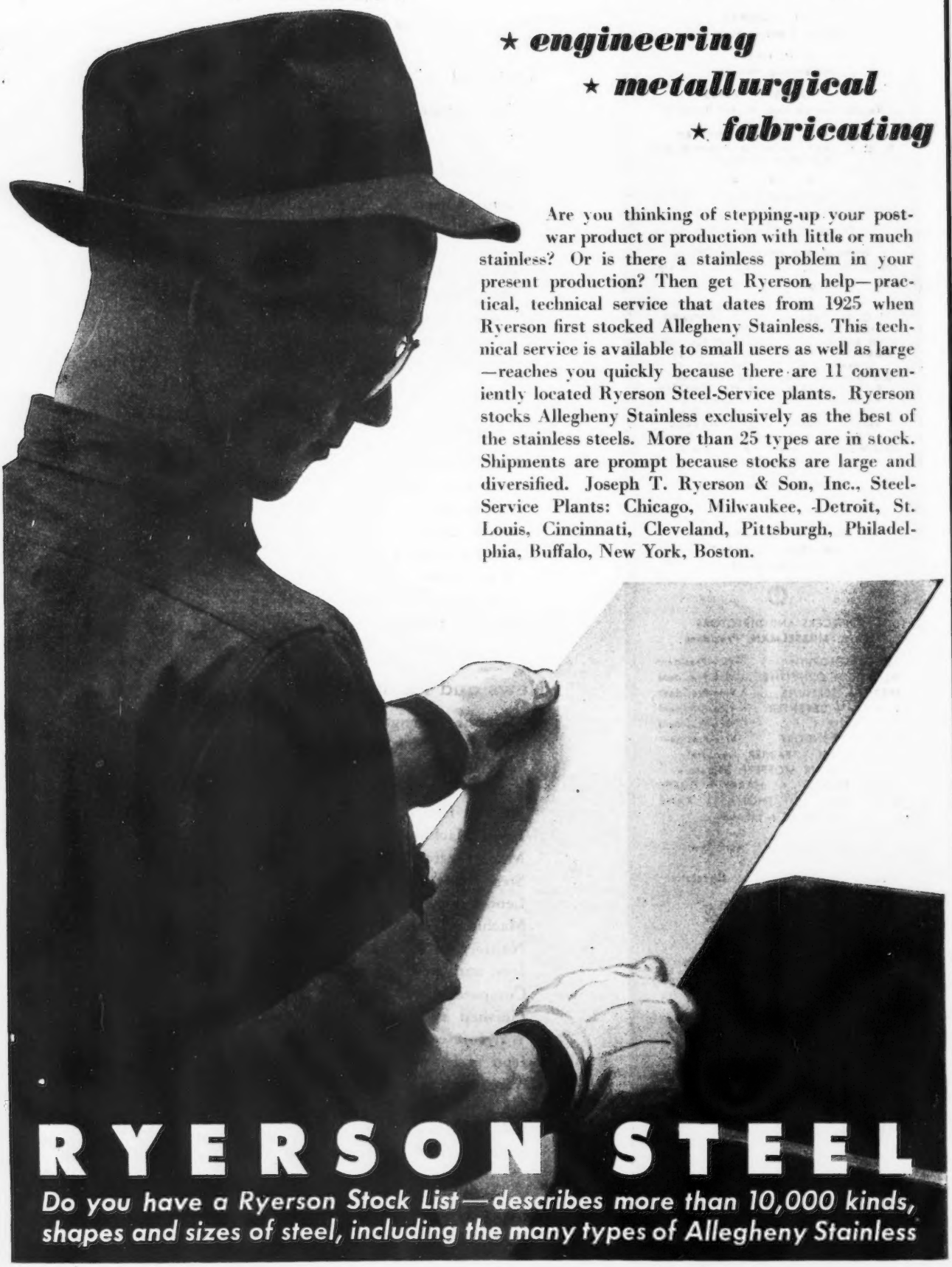

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The IRON AGE

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The Competitive Spirit

GERMANY had military drill down pat. Her soldiers marched and counter-marched with clock-like precision. Even the ridiculous goose step was an attainment not lightly to be acquired and exemplified exactness of timing.

The German people liked to watch their soldiers drill. Whether they would have paid an admission fee to see them is another question for none was charged. It was a free show with a sales promotion motive selling the public the war spirit and regimentation.

People who like regimentation do not care for such American sports as baseball and football. And by the same token and in reverse, Americans do not take pleasure in regimentation. We fill baseball stadiums and football fields to capacity at a substantial admission price and will sit for four hours or more watching a double-header. Imagine getting a crowd of 30 to 40 thousand to pay a dollar or more per to watch the West Point cadets march up and down.

This American fondness for competitive sports is a national characteristic. Americans like to compete or next best to watch others do it. Competition puts the spice of adventure into life, whereas regimentation kills it.

We must hold fast to this national characteristic for it has made us what we are and without it we cannot become what we want to be. That is something to think about very seriously in these days when there are opposing views as to what we should be and what should be done to us in our postwar period.

Especially important to our future will be the relation of government to business. By business I do not mean just trade but everybody's business whether it be managing a steel plant or shoveling ore into a furnace.

There are some who want government to make the plans for business as well as to make the rules for it. Germany did that. It had a master plan; a fascistic concept that led inevitably through regimentation into the disastrous concept of the master-race.

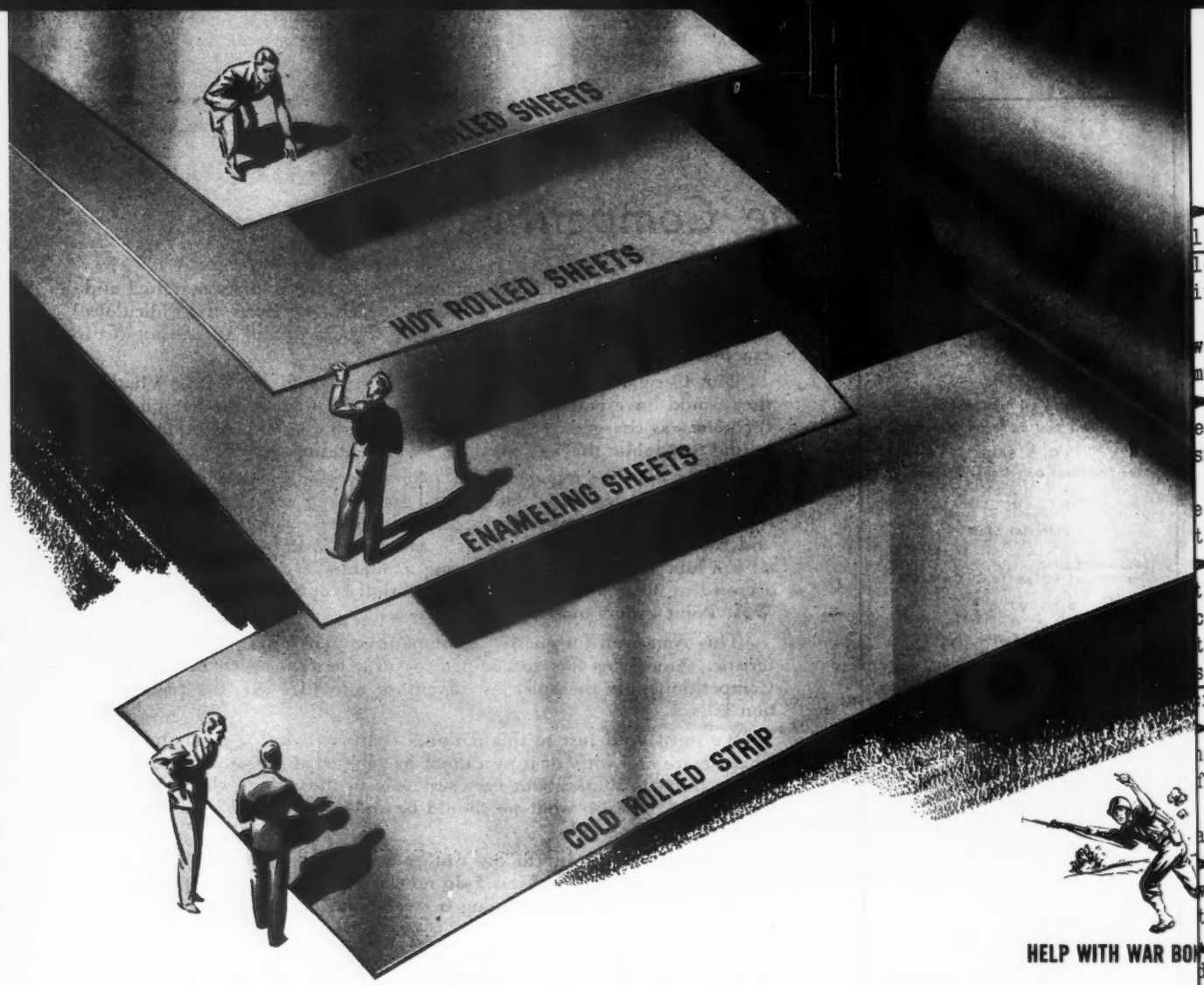
I like Paul Hoffman's idea of competition in planning, as exemplified in the activities of the Committee for Economic Development. Its endeavor is to get two million individual employees to make two million individual plans for the future of their businesses, rather than to be forced to follow a master plan set up by a few selected individuals. Americans as a race do not like the word "master" nor its obverse which connotes a condition of slavery.

Getting back to baseball, the most loved of American sports, I think government has much to learn from it, in considering its own future relation to business.

Anything can happen in a baseball game and usually does. The spirit of competition and team work is allowed the fullest play, but all plays are made subject to the rules. The umpires do not compete with the players.

In baseball, the rules are simple and thoroughly understood by the players. And they are not changed during an inning, a game or a series.

That's the way it should be, I think, in our relationship between government and everybody's business, including yours and mine, in our American postwar World Series.



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The IRON AGE
June 12, 1945

NEWS FRONT

► Germany, second largest steel producer in the world, will have its ingot output limited to some 4,000,000 to 5,000,000 tons yearly to assure demilitarization. Obsolete equipment will be scrapped, and most of the heavy forging and centrifugal casting installations will either be destroyed or removed.

Decisions regarding the future of the Herman Goering works at Braunschweig will be watched with great interest. This war-built German plant is one of the largest and most modern in the world, and may fall within the Russian zone of occupation.

► Sintered carbide penetrators were used on most German shells. Toward the war's end the demand for large sizes was so great that a procedure was developed to reprocess small penetrators into compacts for large shells.

A new sintered carbide has been developed by the Germans, simpler than those used elsewhere in the world and capable of equal or superior performance in cutting operations.

► Demonstrating the impact of jet aircraft requirements on stainless steel production, only about half of the output now is in the 18-8 group. Tailor-made analyses continue on the upgrade, with make up determined by the engineering design of the particular item for which the steel is to be used. Columbium and titanium stainless steels have gained particular importance. Producers expect that with return to civilian uses the 18-8 group again will predominate.

► Of 200,000 passenger cars authorized for production in the United Kingdom in the next twelve months, half are earmarked for overseas export. The official greenlight for automobile production in England was dated June 11.

Also authorized for production to bolster England's foreign trade are machinery, abrasives, and some additional hard goods.

► Economic Stabilizer Vinson states that cutbacks on munitions in the third quarter will amount to 12 per cent, and to 35 per cent by the end of the year. In six months the volume of production will be at the 1943 level.

▲▲ Washington continues to be concerned about the impact of cutback news in war production centers. Considerable effort is being made by some agencies to prevent labor dislocation by timely news handling.

No effort is being made, however, to speed reconversion and avoid labor dislocation by furnishing information with plant data for the use of manufacturers through the business press. Official thinking is that what information is released is only for the use of local newspapers in the areas affected.

► Setup charts for automatic screw machines have been developed by Curtiss-Wright. These charts are of particular use in problems involving approximations of feeds, speeds and related data in that the answer can be arrived at in the matter of seconds by the mere process of visual analysis, eliminating the necessity for length computations.

These charts have been developed for automatic screw machines in which the feed mechanism is driven by the spindle drive shaft, like the National-Acme, Conomatic and New Britain-Gridley screw machines and for machines in which the feed mechanism drive is independent of the spindle drive, like Brown &.Sharpe, Davenport and Cleveland screw machines.

► Superior atmospheric corrosion resistance of certain high strength steels is due to the more dense, tightly adherent and highly protective rust coat which forms on their surfaces. One particularly important characteristic of this type of rust coat is its uniformity. It is practically free from spalling.

Because of the inherent corrosion resistance of the low alloy, high strength steels, even greater weight saving can be obtained on mobile structures where corrosion is a controlling factor in determining thickness of plate, than strength considerations alone would dictate.

► The inability of steel exporters to get any information in regard to future export policies is creating a fear that at least for the next few years dealings will be with the State Department for most export trade, under some revision or modification of lend-lease.

SETUP CHARTS For Automatic

THE charts contained in this series of articles were originally conceived by the author in order to save extensive work in computing and determining feeds and speeds and related data in the course of investigating the manufacture of screw machine parts under the unusual circumstances presented by wartime conditions. After the initial charts were developed, their usefulness and utility were so apparent that it was found advisable to devise similar charts for other types of machines, particularly those like the Davenport wherein the relationship of feed per revolution is not readily obtainable. In this way all guesswork with relation to this factor would be eliminated. The charts developed for use in setting up Davenport screw machines were so successful that the author then turned his attention to the development of charts for the design of cams for use on Brown & Sharpe screw machines.

These charts are of particular use in problems involving successive approximations in that the answer can be arrived at in the matter of seconds by the mere process of visual analysis, eliminating the necessity for lengthy computations. The enormous saving in time and effort with the elimination of errors is readily apparent and these charts should prove to be of inestimable value to designers, time study men, methods engineers, foremen, setup men and operators alike. Their usefulness for the latter categories should be in giving these men a better understanding and a visual indication of the limitations

FIG. 1—Coarse feed change gear setups for 1⅝ in. 8 spindle Acme-Gridley screw machines.

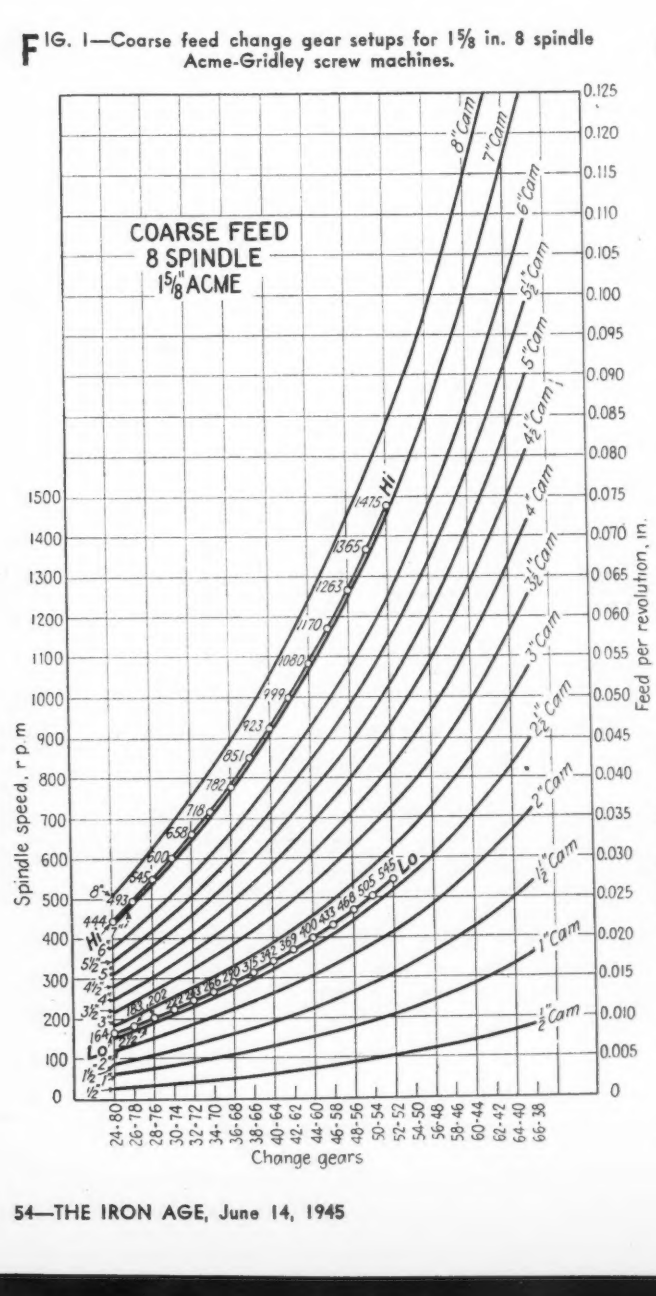
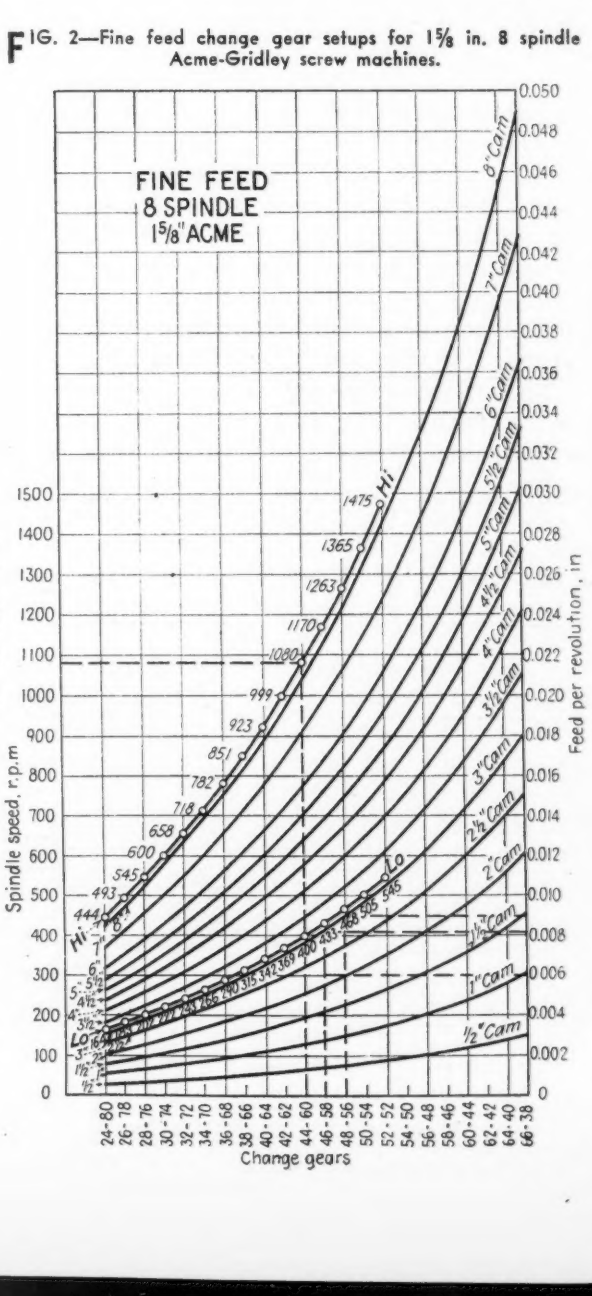


FIG. 2—Fine feed change gear setups for 1⅝ in. 8 spindle Acme-Gridley screw machines.



Screw Machines

By JOHN J. MEADOWS
Development Engineer, Development Division, Curtiss-Wright Corp.

. . . By graphical methods, problems involving speeds and feeds can be solved in a fraction of the time necessary to make the calculations from handbooks. In the first articles of the series, 11 charts are presented for various sizes of Acme-Gridley screw machines. In succeeding articles, change gear setup charts will be printed for Conomatic, New Britain-Gridley, Davenport and Brown & Sharpe screw machines.

and possibilities of their machines.

These machines generally can be divided into two classes: (a) Those whose feed mechanism is driven by the spindle drive shaft, and (b) those whose feed mechanism is driven by an entirely independent drive. In the former category, the relationship of feed per revolution depends entirely upon the feed change gears installed in the machine. Changing the spindle speed has no effect upon the feed per revolution. In the latter category, feed per revolution can be determined normally only by lengthy computations. For that reason, in most cases, no effort is made to determine the feeds and speeds on such machines; instead guesswork is resorted to, with resultant overloading of machines, tools, and materials.

In this latter category, also, are included machines having special multi-lobe cams which have to be computed. In many cases these designs depend upon successive approximations to arrive at the correct design. Often this requires complete redesign and in order to cut corners rough approximations are substituted for more precise calculations, with the result that actual feeds and speeds are unknown. This often causes overloaded machines, tools and materials. The curves presented in this series enable the designer to base his layout upon actual feeds and speeds, thereby eliminating guesswork and increasing the efficiency of operation, at the same time eliminating the necessity for lengthy computations and the possibility of errors resulting therefrom.

Included in those types of automatic screw machines in which the feed mechanism is driven by the spindle drive shaft are such machines as the National-Acme, Conomatic and New Britain-Gridley screw machines. In the latter category in which the feed mechanism drive is independent of the spindle drive, are included the Brown & Sharpe, Davenport, and Cleveland screw machines. The former type of machine, because of the simplicity of the factors involved permits the use of a rather simple form of chart which therefore will be presented first.

Because of the independent drive in the latter type of screw machine, additional factors are introduced which considerably complicate the problems involved to the extent that successive approximations must be introduced in order to arrive at a satisfactory solution. Although the actual computations used in arriving at the solutions for the latter type of machines are rather complex, the graphical solution of the problems by means of these charts actually resolves itself into very simple visual analysis eliminating entirely the need for any complex equations. Simple rules of procedure will be presented for each make of machine which, if followed, will make possible the rapid solution of any problem within the limitations of the charts.

Acme-Gridley Machines

The Acme-Gridley bar machines are the least complicated of all machines considered. They are multi-spindle machines driven from a main drive shaft located on the right hand tower of the machine. This shaft provides a direct drive to the main drum shaft through a roll or over-running clutch for the high speed movement of the drum shaft during the indexing and stock feeding operations. It is also equipped with a two speed clutch for high and low spindle speeds. This latter clutch meshes with mating gears on the spindle speed change gear shaft which in turn drives the spindle drive shaft through change gears. These change gears are represented on the charts and are chosen by means of the vertical line passing through the spindle speed curves at the nearest available spindle speed to the one desired. These available speeds are represented by encircled dots along the spindle speed curves. There are two of these curves on each sheet one marked Hi and the other Lo, corresponding with the high or low speed setting of the clutch.

On most Acme-Gridley screw machines the spindle change gears and the feed change gears are located on the right hand end of the machine behind a removable cover. The spindle change gears are usually to the right and the feed change gears to the left when looking into the enclosure and are interchangeable. In the 1¼ in. Acme-Gridley, however, the feed change gears are located in a box on the front side of the machine. This type of installation differs from the others only to the extent that there are four feed change gears instead of two. Otherwise, the effective drive is the same. The driver gear of the feed change gear unit is mounted on the spindle drive shaft or geared to it so that change in spindle speed will not affect the feed per revolution provided that the feed change gears have not been altered. The main drum shaft is driven from the feed change gear shaft through a main worm gear. Normally this drive is from the feed change gears which provide the desired feed per revolution during the cutting operation. However, during the indexing and feeding operations, the high speed disk clutch is engaged and this overdrives the main drum worm through the roll clutch men-

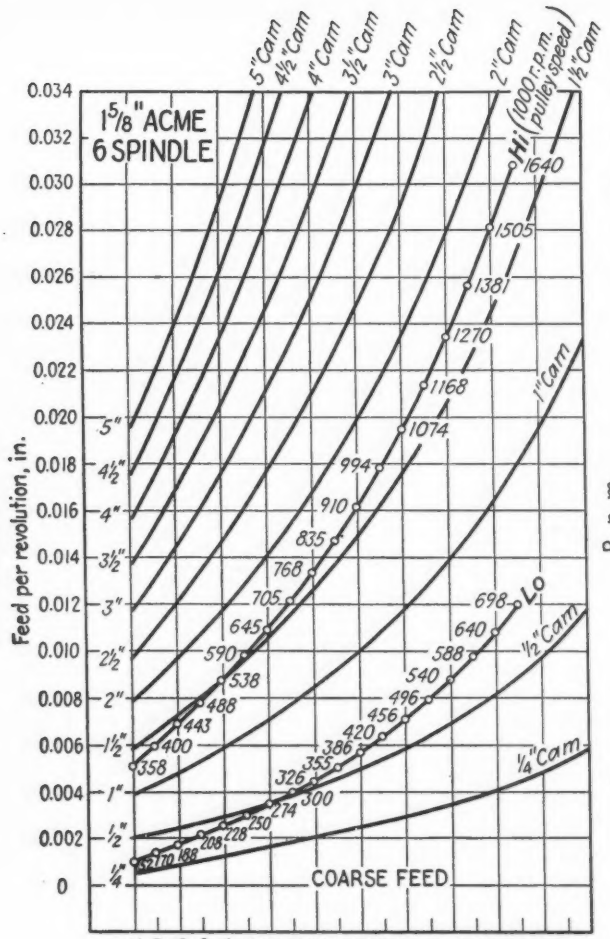


FIG. 3—Coarse feed change gear setups for 1⅝ in. 6 spindle Acme-Gridley screw machines.

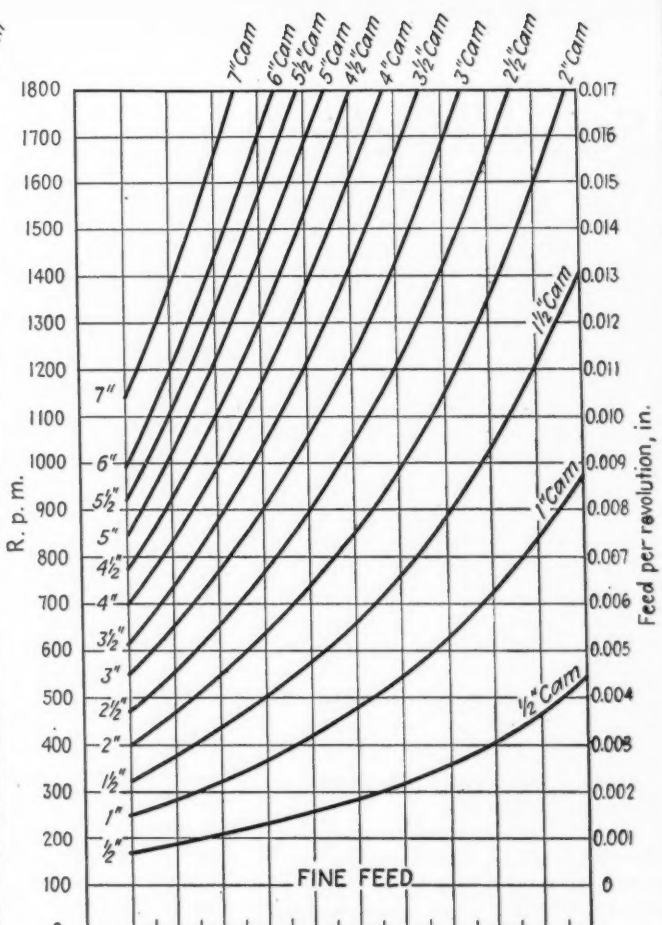


FIG. 4—Fine feed change gear setups for 1⅝ in. 6 spindle Acme-Gridley screw machines.

tioned previously. The feed drive of these machines is provided with a high-low speed clutch excepting those machines equipped with four change gears which enables them to have the same range of feeds.

The movement of the main tool slide is controlled by a cam mounted on the main drum shaft as is the actuating of the high speed disk clutch. Also mounted on the main drum shaft are the chucking, stock feeding, indexing, stock feed stop, brake, threading and reaming cams. Each cross slide has an independent operating drum cam or crank driven by gearing from the main drum shaft. Individual positive stops are provided for the cross slides in order to insure the proper sizing of machined parts.

The charts, Figs. 1-5, are used as follows:

The desired spindle speed is found along the left hand edge of the chart and the corresponding horizontal line is followed to the right until the spindle speed curve is intercepted. The nearest encircled dot on the spindle speed curve is the nearest obtainable speed on the machine. The vertical line through this dot is followed to the bottom of the sheet and the proper change gears are found on that line. Then the desired feed is selected along the right hand side of the chart and the corresponding horizontal line followed to the left to its intersection with the proper cam curve. The nearest vertical gear line to this intersection is adopted and the exact feed determined from the horizontal line passing through this intersection. After the feed gears have been determined to give the correct feed for the principle element of the operating cycle the feeds for the other elements can be determined by merely following the vertical line corresponding with these gears to its intersection with the various cam curves corresponding to the cams in use. The feeds will be indicated by the horizontal lines passing through these intersections.

Should the feed for any element be too high or too low, familiarity with the chart will indicate whether the cams should be changed or different feed gears installed or both, and how much of a change should be made.

Example for 1⅝ In. Size

Assuming that a spindle speed of 1100 r.p.m. is required with a 0.006 in. feed per revolution on the principal operation for which a 2 in. cam is necessary, and assuming that no feed on any operation is to exceed 0.008 in. and that the other cams are to be 1, 1¼, and 3 in., by referring to the 1⅝ in. 8 spindle Acme-Gridley charts, it will be found that the cam ranges out of the feed zones on the coarse feed chart, Fig. 2, whereas it

is easily determinable on the fine feed chart, Fig. 1.

Therefore, if a horizontal line is extended to the right from 1100 r.p.m. in Fig. 1, it will intersect the *Hi* curve at about the middle of the chart and the nearest obtainable speed for this machine will be found to be 1080 r.p.m., represented by the encircled dot on the spindle speed curve. This represents an error of less than 2 per cent and is not objectionable. If the vertical line is followed from the above intersection to the lower margin, the spindle change gears responsible for this condition will be found, in this case 44/60, the 44 tooth gear being the driver and 60 tooth gear the driven member.

If a horizontal line is drawn from the right hand side of the chart at 0.006 in. feed to intersect the 2 in. cam curve, the recommended change gears will be found to be the 48/56 combination. However, the other feeds must first be checked to see that all requirements are met. This is done by following the vertical 48/56 change gear line to its intersections with the 1, 1¼ and 3 in. cam curves. The intersection of the 1 in. cam curve indicates a 0.003 in. feed. The intersection with the 1¼ in. cam curve should be interpolated between the 1 and 1½ in. curves which will indicate a 0.0038 in. feed. The intersection with the 3 in. cam curve will indicate a 0.009 in. feed. This is 12 per cent too high and would result in tool trouble from overloading. Therefore, the feed change gear line must be shifted to the left to reduce the feeds. This is done by following the 3 in. cam curve until an indicated feed of 0.008 in. has been reached. This is the maximum permissible value.

At the next adjoining gear line the 3 in. cam curve indicates an 0.0082 in. feed which is only a 2.5 per cent plus error and is permissible. If the other cams are checked, the errors for the 46/58 gear line will amount to only 2 per cent minus. These are approximately correct and in the direction of improved performance consequently the 46/58 change gears should be used. This method is applicable to all of the Acme-Gridley charts except the 1¼ in. machine which requires a slightly different technique.

Example for 1¼ In. Size

With reference to the 1¼ in. Acme-Gridley machines, an analytical chart is presented in Fig. 6 showing the feeds obtainable with the four change

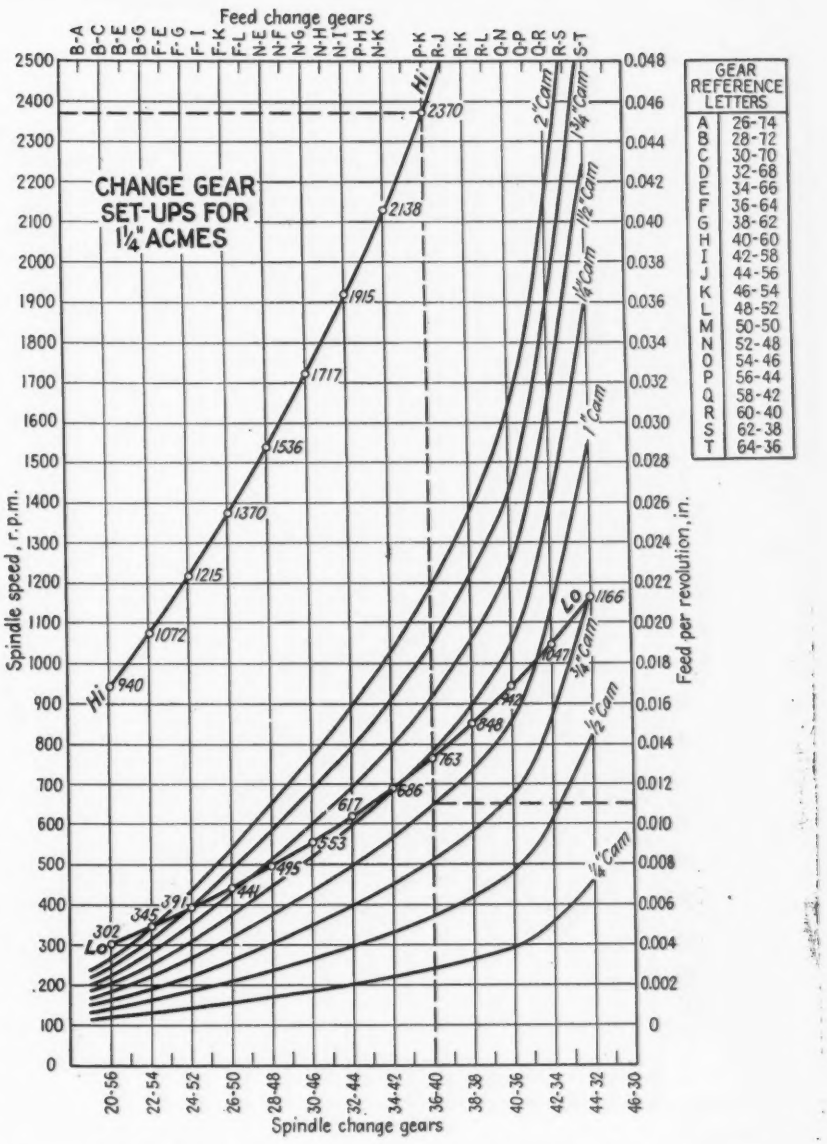


FIG. 5—Change gear setups for 1¼ in. Acme-Gridley screw machines.

gears provided. These are indicated on the chart points corresponding with the gears given on the setup chart. These are indicated by encircled dots. A corresponding linear chart is given along the right hand edge of the main chart. However, the National Acme Co. does not normally furnish gears corresponding with the data furnished. The gears normally furnished correspond with the points enclosed in triangles on the chart. The points enclosed in squares differ from the data furnished by the National Acme Co. and have been substituted in order to produce continuous curves on the setup chart. It will be noted that the data for many of these gear setups are interchangeable in that they give the same results.

To illustrate the charts designed for the 1¼ in. Acmes, it is assumed that a spindle speed of 2400 r.p.m. is desired and 0.011 in. feed with a 1 in. cam action. A line is drawn on the 1¼ in. Acme-Gridley setup chart (Fig. 5) at 2400 r.p.m. and intersects the *Hi* curve. The nearest obtainable speed indicated is 2370 r.p.m. This is a 1¼ per cent minus error and is permissible. The proper spindle change gears would be the 36 tooth driver and 40 tooth driven gear.

In the same manner a line is drawn from the right side at 0.011 in. feed. This line is traced to its intersection with the 1 in. cam curve, from which a vertical projection indicates a *P-K* gear combination for the feed drive. Referring to the gear reference chart,

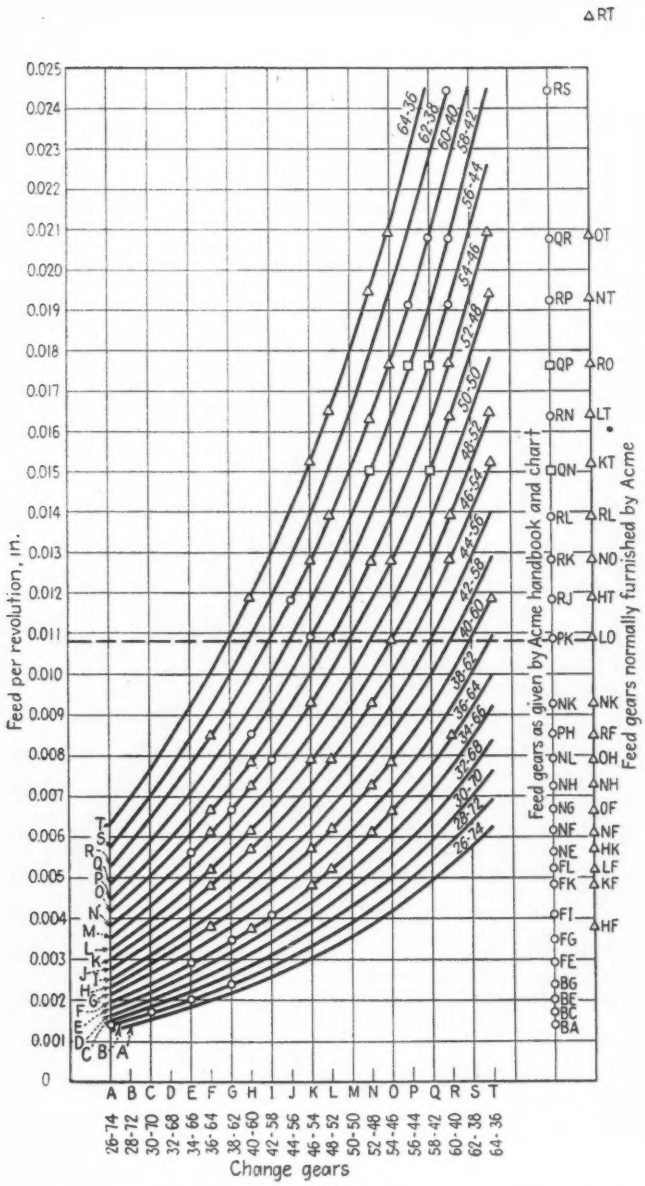


FIG. 6—Feeds obtainable with 1 in. cam with available change gears for 1¼ in. Acme-Gridley screw machines.

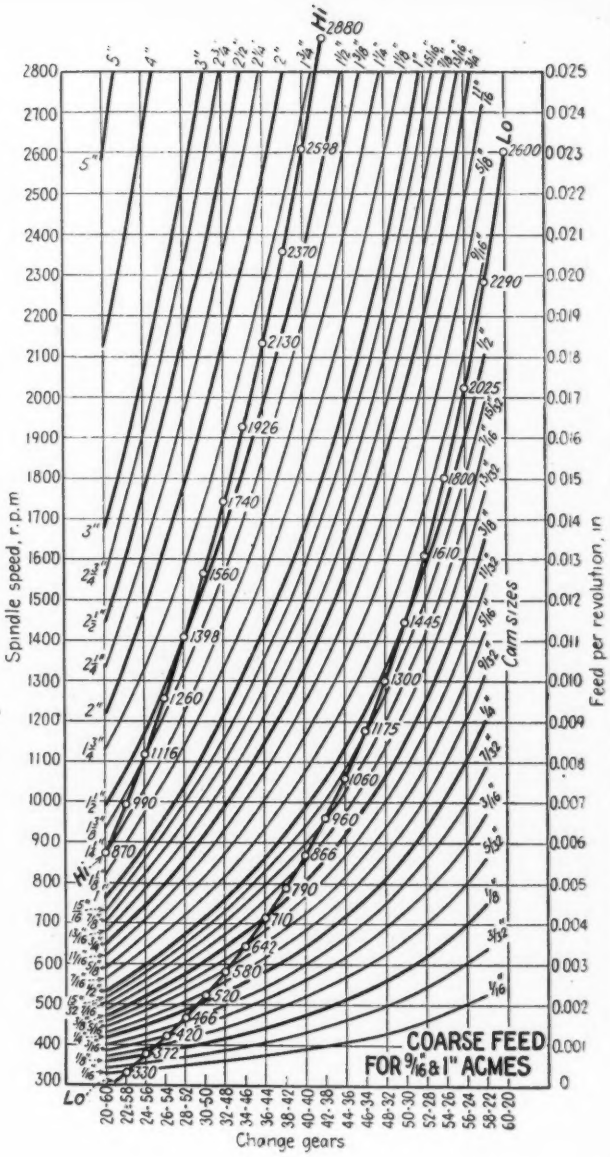


FIG. 7—Coarse feed change gear setups for 9/16 and 1 in. Acme-Gridley screw machines.

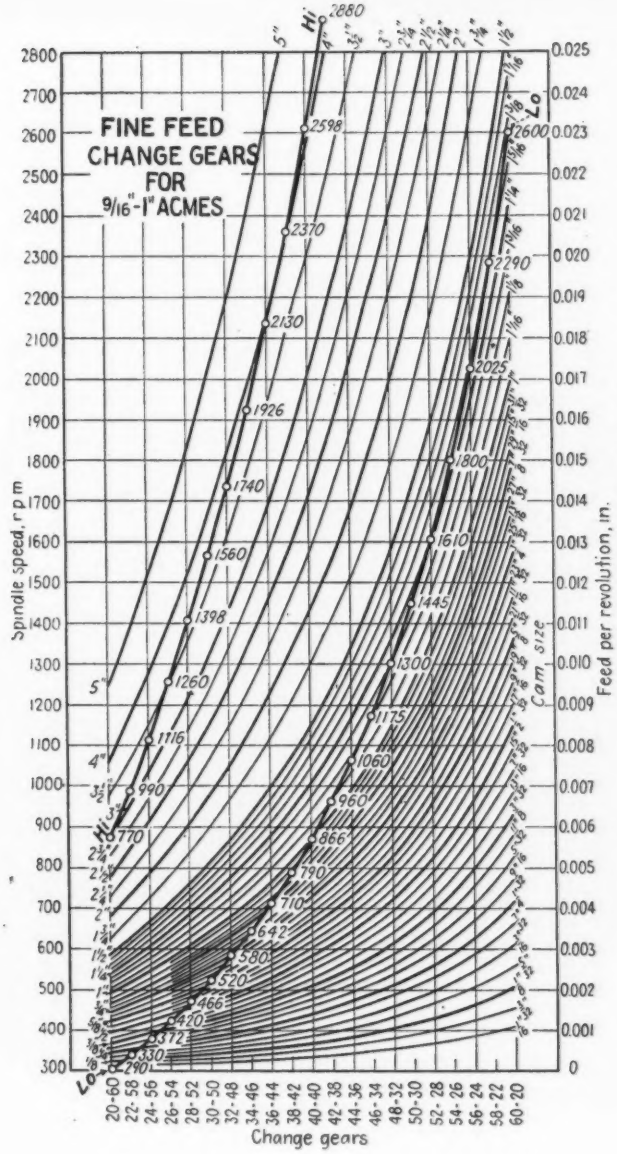
the letter *P* represents a 56 tooth driver and 44 tooth driven gear, the latter on the jackshaft. The letter *K* represents a 46 tooth driver and 54 tooth driven gear, the former on the jackshaft and the latter on the feed driveshaft.

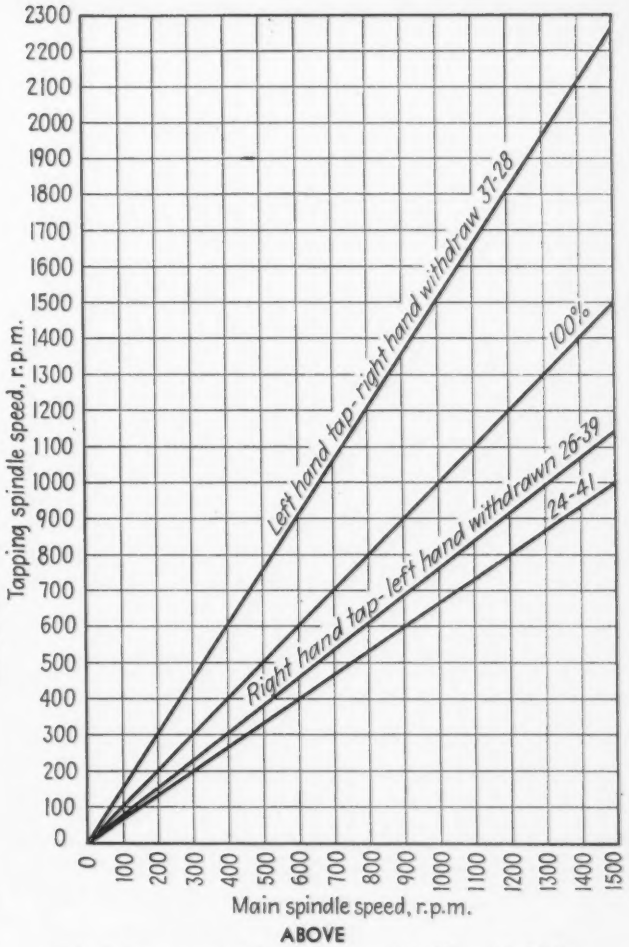
Unless the machine happens to be specially equipped with a complete set of change gears ranging from 26 to 64 teeth, it will not be equipped with *P* gears. It will be necessary, therefore, to make substitutions. For this purpose, reference chart entitled "Feeds Obtainable with 1 in. Cam with Available Change Gears for 1¼ in. Acme-Gridleys" is used, Fig. 6. To the right of the chart are two columns of letters representing respectively the change gears as listed in the Acme handbook and those that are furnished with the machines.

Since this operation involves a 1 in. cam, this chart can be used directly without correction. Such correction would be proportional to the rise of the cam. Therefore, a line is drawn to the right from 0.011 in. feed and followed to the first column of letters. Here the letters *P-K* are found, the combination that was obtained in the main chart. Opposite this in the second column the letters *L-O* are found. Either of these combinations will give the same results as will all combinations represented by the intersections along the 0.011 in. feed line. All combinations on any feed line are interchangeable. Since the *L-O* gears are standard on these machines, they should be available. They represent 48/52 and 54/46 tooth combinations and would be the gears to use, provided all operations check for proper tool feed.

Tapping Charts

Charts are also provided to readily determine desirable or proper tapping drive gears for each available size of machine (See Figs. 9, 10 and 11). These charts give a clear visual picture of how tapping is accomplished.





ABOVE

FIG. 9—Tapping spindle gear setups for 1⅝ in. Model RA 8 spindle Acme-Gridley screw machine.

° ° °

LEFT

FIG. 8—Fine feed change gear setups for 9/16 and 1 in. Acme-Gridley screw machines.

For a right hand tap the tapping spindle is driven in the same direction as the main spindle but at a proportionately slower speed. Two such speeds are usually provided for choice. The actual tapping or cutting speed is the difference between the speed of the main spindle and that of the tap. Withdrawal is accomplished by speeding up the tap to a speed greater than the main spindle. The chart is used as follows:

Enter the chart at the main spindle speed as it exists or is set up on the machine. Intersect the 100 per cent curve and use the vertical line through this intersection in arriving at the proper tapping gears. The intersection of this vertical line with the tapping and withdrawal curves will give the speed of the tapping spindle shaft. The speed that best suits the required conditions should be selected. The necessary gears to give that speed may be determined at the right hand end of the tapping and withdrawal curves.

For high speed drill spindles, the usual ratio on Acme-Gridleys is 100 per cent, giving a 2 to 1 speed up.

Tapping Example

To cut a ¼ in. thread with a peripheral cutting speed of approximately 25 f.p.m., the speed should be approximately 350 r.p.m Assuming that the main spindles are turning at 2000 r.p.m. and that the work is being done on a 1¼ in. Acme, on the tapping chart for the 1¼ in. Acme, Fig. 11, a vertical line is drawn at the 2000 r.p.m. line at the bottom of the chart and followed up to the 100 per cent curve which is at the point of zero differential or at the point where both spindles are turning at the same speed. To cut a right hand thread it is necessary for the tap spindle to turn more slowly than the main spindle. Since the main spindle is operating at 200 r.p.m. and the desired cutting speed is 350 r.p.m., the tap spindle should rotate at 1650 r.p.m. To find this point, the same vertical line is followed down (2000 r.p.m.) a distance to scale of 350 r.p.m. which will be at the horizontal line representing 1650 r.p.m. The nearest tapping curve

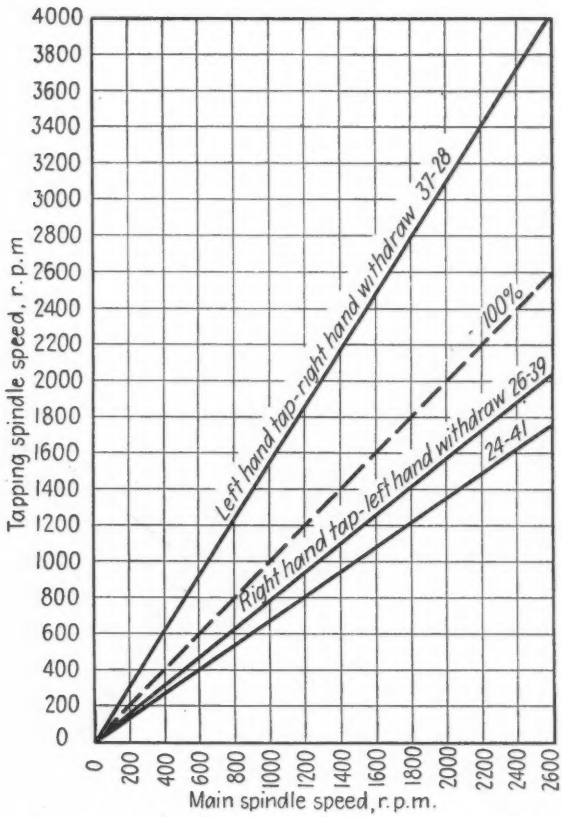


FIG. 10—Tapping spindle gear setups for 1⅝ in. Model RA 6 spindle and 2 in. Model RAS 6 spindle Acme-Gridley screw machine.

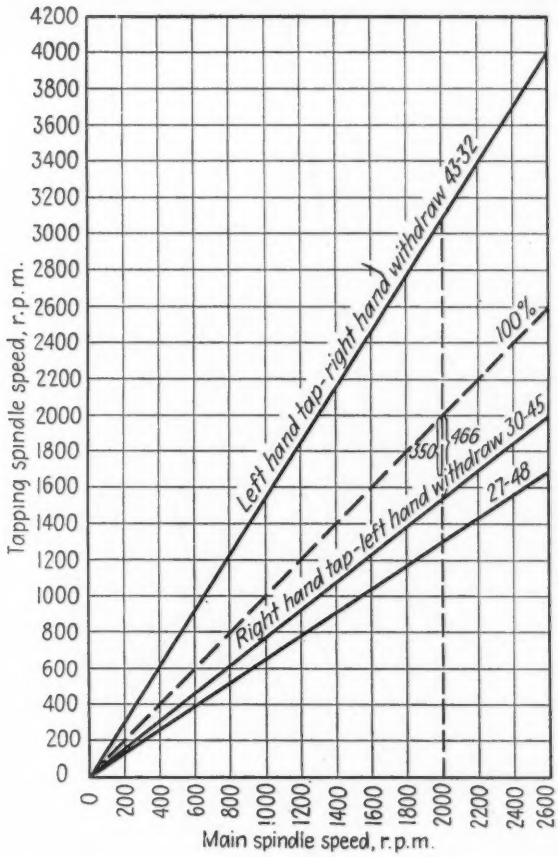


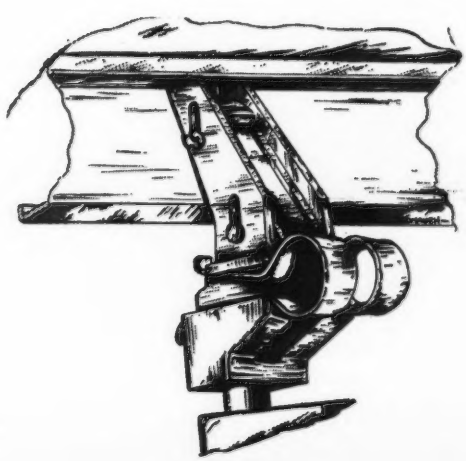
FIG. 11—Tapping spindle gear setups for 1 and 1¼ in. Model RA 6 spindle Acme-Gridley screw machines.

indicates a cutting speed of 466 r.p.m. or 31 f.p.m. If this is satisfactory, the 30/45 gear combination should be used. If not, a special gear combination, such as 31/44 which would give a cutting speed of 390 r.p.m., should be used. In place of this it would be necessary to reduce spindle speeds, thereby increasing cycle times. In such a case a compromise would have to be effected.

For withdrawal, the 43/32 gear combination would be used and it would be determined from the curve that withdrawal would be at 3040 r.p.m., giving a withdrawal speed of 1040 r.p.m. provided no change has been made in spindle speeds. Knowing the number of threads to be cut, the exact cycle times can be determined from these speeds.

[In a succeeding issue charts for Conomatic screw machines will be presented.]

A RIVET set which makes it possible to rivet Z-type angle sections with both speed and ease on a Chicago automatic riveter has been developed at Consolidated Vultee Aircraft Corp., San Diego. As indicated in the accompanying illustration, the set has an angle equal to or greater than the angle of the Z. This eliminates the standard set interference which frequently makes it impossible to rivet Z angles automatically. The new set can also be used for the riveting of assemblies with other types of structural angles.



High Strength Steels

Pace Lightweight Development

. . . Because of the inherent corrosion resistance of the low alloy, high strength steels, even greater weight saving can be obtained on mobile structures where corrosion is a controlling factor in determining thickness of plate, than strength considerations alone would dictate. The author evaluates these steels from their relative technical and economic advantages for the construction of railroad rolling stock, mine and dump cars, trucks and trailers, and barges.

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By F. D. FOOTE
Alloys Development Corp.
Pittsburgh

o o o

CONSIDERABLE confusion has been caused in the minds of consuming engineers on account of the lack of an official terminology for the group of steels which are basic in this discussion. The terminology commonly applied includes the following: High tensile steel, low alloy steel, mild alloy steel, high yield steel and even lightweight steel. Not all of these designations are accurate and some are even misleading. The term "corrosion resistant, high strength steel" is preferred by the author, but for the sake of brevity "high strength steel" will be used in this discussion.

A large steel producer, who pioneered one of the earliest and best of these compositions more than a decade ago, has promulgated a definition which specifies the following: "The term low alloy, high strength steel is meant to include steels to which moderate amounts of alloying elements have been added, imparting in the as-hot-rolled condition a yield point of 50,000 lb. per sq. in. minimum, in sections ½ in. thick and lighter, and which experience indicates will result in atmospheric corrosion resistance four to six times that of mild steel."

A minimum degree of several important properties must be possessed in a composition suitable to the purposes for which this group of superior steels was designed. Otherwise, it would be inadequate to serve engineering needs in some one or more respects, and would therefore be disqualified. In considering this subject, it is sometimes illuminating to point out that this group of steels was developed to displace ordinary structural steel for many important uses in large tonnage markets. If the group is thought of as comprising better grades of ordinary steel which have resulted from metallurgical progress and advancement in the art of steelmaking, a good bit of the mystery and confusion which surround them will be avoided. Too frequently some one of the essential properties of a high strength steel is overemphasized, and thus given a degree of importance out of proportion to its rightful place in the overall engineering problem. Gratifying as it would be to find a material ideal in all of its characteristics, no such happy outcome is expected by metallurgists and engineers of a practical turn of mind. It seems wise, therefore, to consider the homely adage that "good enough is the best"; that anything more than an adequate degree of each of the several properties essential to the purpose is superfluous and can be obtained only by adding to cost.

The overemphasis which is placed upon the importance of one property when compared with another arises at times from a desire for a foolproof degree of some characteristic in the material, without regard for a proper balance of other essential properties. Thus, a welding engineer would mark adaptability for welding as his criterion of quality; the boss of the fabricating shop, forming characteristics; a maintenance engineer, corrosion and impact resistance, and so on to the purchasing agent who sometimes has played down quality considerations in favor of price. Since all must be concerned with an inte-

Mechanical Properties of Ordinary Structural Steels and High Strength Steels Compared

	Structural Steel AAR M-116-42 ¾ In. thick and under	Structural Steel ASTM A7-42 ¾ In. thick and under	Typical Example of High-strength Steels ½ In. thick and under
Yield point, lb. per sq. in.	0.5 Tens. Str.	0.5 Tens. Str. but not less than 33,000	50,000 min.
Tensile strength, lb. per sq. in. (Grade A)	60,000–72,000	60,000–72,000	70,000 min.
(Grade B)	50,000–62,000		
(Grade C)	48,000–58,000		
Elongation in 2 in., min. (Grade A)	22 per cent	22 per cent	22 per cent
(Grade B)	25 per cent		
(Grade C)			
Elongation in 8 in., min.	1,500,000* / T. S.	1,500,000* / T. S.	1,500,000* / T. S.
Specimen cold bend (Grade A)	180° D = ½T	180° D = ½T	180° D = 1T
(Grade B)	180° D = ½T		
(Grade C)	180° Flat		

* For material under 5/16 in. in thickness a deduction of 1.25 per cent shall be made for each decrease of 1/32 in. of the specified thickness or diameter below 5/16 in.

HOPPER coal car built of copper - bearing carbon steel after 8 years, 10 months of service. Side, slope, and hopper sheets are of 1/4 and 5/16 in. thicknesses. Note spalls of loose rust on the surfaces of the metal.

grated balance of the several properties *essential* to a given purpose, it is reasonable to discuss the characteristics of these steels from the standpoint of their utility for the particular services in which they are to be used.

The aim of this discussion is to examine the characteristics of high-strength steels well qualified for the construction, in modern lightweight design, of mobile structures used in transportation such as railroad freight and passenger cars, street cars and buses, mine and dump cars, trucks, truck bodies and trailers, ships and barges. First costs, operating costs and service performance will determine the choice of material best suited for the design of such structures. By this method of selection, corrosion and abrasion resistance, and what may be referred to descriptively as toughness, are of first consideration. Adaptability for welding and forming must be possessed in an adequate and satisfactory measure, but if the utmost in weight saving for low cost operation is the chief objective, a structure, when built and placed in service, must be able to "take it" in terms of day-to-day punishment, and to keep on taking it over its economic life span, without loss of essential strength and premature failure due largely to corrosion. This assurance cannot be provided in modern lightweight design without employing materials which possess a marked degree of atmospheric corrosion resistance and, hence, it is contended that this is the most important of the several properties essential in a high strength steel.

HOPPER coal car built of Cor-Ten steel after ten full years of service. The side, slope, and hopper sheets of this car were of 3/32, 1/8, and 5/32 in. thicknesses. Note dense, uniform rust coat which has protected the metal.

Protective Oxide Coating

Service experience, as well as an exhaustive amount of testing, has demonstrated clearly that the superior atmospheric corrosion resistance of certain high strength steels is due to the more dense, tightly adherent, and highly protective rust coat which forms on their surfaces. It has been found that under the usual atmospheric testing conditions about 0.2 gm. per sq. in., or about 0.002 in. in thickness of the better corrosion-resistant steels is used in supplying the metal required to form a good protective oxide film. A period of exposure of at least two years and preferably longer, depending upon the alloying elements employed, is required to ascertain the trend in the probable atmospheric corrosion resistance behavior of a high strength steel.

One particularly important characteristic of the type of rust coat which forms in the atmosphere on the subject steels is its uniformity. It is practically free from spalling; the formation of tubercules or warts of rust which aggravate pitting and cause corrosion to progress steadily. The seriousness and magnitude of the spalling found with plain carbon or copper-bearing steels may be visualized by the fact that over a short period of years a car shop, which specialized in heavy repairs to steel cars, accumulated several thousand tons of scale which it used as fill in a swamp, and later when a market for iron oxide developed, it also sold several thousand tons as iron ore. Tendency to spalling, which exposes fresh surfaces to the weather, is resisted by the relatively thin, tough and adherent rust coat of these corrosion resistant steels. To those who are familiar with the electrolytic nature of the corrosion processes, the advantages of this type of scale will be apparent. Paints, surface preparations for painting and methods of paint appli-

eation are varied so that no quantitative statements can be made as to the longer life and greater adherence of paint on the surfaces of these steels. However, it seems apparent from the paint performance on the many freight cars built from corrosion resistant steels that the facts referred to above do contribute to greater adherence and, hence, longer life of the paint.

If we examine the influence of the individual elements on the atmospheric corrosion resistance of a ferrous material, we find that some are definitely beneficial when used alone, some slightly so and others negative in their effect or even harmful. When used in combination, these same elements are sometimes surprisingly beneficial and in a manner not to be expected by their effect upon corrosion resistance when used alone. In other words, the corrosion expert has found that sometimes two and two make five.

There are several reasons for using more than one alloying element to produce the physical properties of a good high strength steel, and this turns out to be a favorable circumstance in regard to corrosion resistance. For instance, phosphorus, which is probably the most effective element for improving atmospheric corrosion resistance when used alone, is even more beneficial when used with small amounts of copper. As another example, chromium is not a potent corrosion inhibitor when used alone in amounts under 2 per cent, but when added to the combination of phosphorus and silicon a marked improvement is noted. Similar phenomena are obtained with nickel in various combinations, particularly with copper.

In the range in which the above elements can be used to make a satisfactory high strength steel, the previously mentioned formation of a protective type of rust coat will prevail approximately in the following type compositions:

Cr-Si-Cu with P

Cr-Ni-Cu with P

Mo-Si-Cu with P

High Cu (¾ per cent), high Ni (1½ per cent)

A combination of relatively small amounts of the alloying elements in some steels of this character provides a highly protective oxide coating at low cost. Increasing the amount of the alloys in these combinations will neither substantially nor economically improve the corrosion resistance of the steel. Copper-bearing steel (0.20 per cent copper minimum) is recognized as having an atmospheric corrosion resistance about two times that of plain steel. The best of the high strength steels have an atmospheric corrosion resistance two to three times that of copper-bearing steel. Since it is generally not practical nor desirable, for reasons of economy and good working characteristics, to employ the corrosion inhibiting elements for their maximum effect, the compositions best suited to the purposes discussed are those which have a proven atmospheric corrosion resistance four to six times that of plain carbon steel.

Corrosive conditions are variable throughout the applications of steel, being much more severe in a railroad hopper car than in a box car, for example. While service performance is the ultimate proof, it cannot be had when the intended application of high strength steel is a new one. An engineer must, of necessity, draw upon such other knowledge as may be at hand. When one of the outstanding high strength steels was introduced in 1933, there was made available a steel which by careful testing was proven to have an atmospheric corrosion resistance of the degree referred to; namely, four to six times that of plain steel, or two to three times copper-bearing steel. This was a composition whose relation to copper-bearing steel, as regards atmospheric corrosion resistance, was the same as that existing between copper-bearing and plain steel. The question then arose as to the probable performance of this steel in railroad hopper car service for the transportation of coal. Reasoning from the demonstrated comparison of the corrosion resistance of plain and copper-bearing steel in such equipment, it was concluded that the subject high strength steel would have a corrosion resistance in actual service equal to 1½ times that of copper-bearing steel.

In support of the above conclusion,

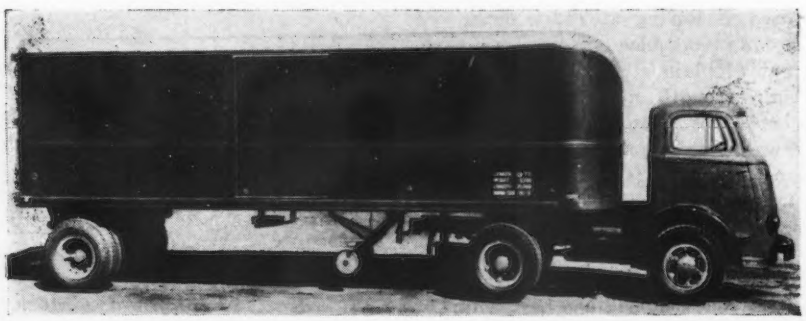
THE weight of this box car in corrosion resistant, high strength steel is 36,800 lb., as compared with 45,000 lb. for a standard A.A.R. car in copper steel of the same inside dimensions. Automatic arc welding was employed for attachment of side sheets to framing members. Built by General American Transportation Corp., Chicago.

THIS heavy-duty truck of 10 cu. yd. capacity is subjected to heavy impacts from falling rocks. Body plates and framing members are of corrosion resistant high strength steel. Built by Six Wheels, Inc., Los Angeles.

reference can be made to the service performance of a series of hopper cars built with plain steel in one-half of each car body, and copper-bearing steel in the other half. These cars were kept under close observation, and when finally they needed overhauling, it was found that the copper-bearing steel had a corrosion resistance which provided a service life 40 to 50 per cent longer than that of plain steel. In other words, a superiority in the *atmosphere* of two to three times was reduced to one and one-half times under the service conditions to which these cars were subjected over a period of years.

A striking example of the superior service life to be expected from corrosion-resistant steels, when compared with ordinary carbon steel, was afforded by an accident which, in 1936, resulted in a stray slab of the latter getting mixed in with slabs of hign strength steel, and inadvertently rolled into intermediate slope sheets for hopper cars. A little over six years later the nine sheets which were rolled from the stray slab failed and had to be replaced. The facts in the case were proven by tracing the material and determining its chemical analysis to be that of plain carbon steel. The high strength steel sheets in this series of cars are still in satisfactory condition after having been in service for approximately ten years.

THIS semi-trailer of corrosion resistant, high strength steel weighs only 6300 lb., yet it is 28 ft. long, and has a capacity of 25,000 lb. Built by Herman Body Co., St. Louis.



Where corrosion is a controlling factor in determining thickness, the substitution of high strength steel on the basis of strength alone is not in order. A method for combining the two requirements is suggested. The side sheets of a hopper car, which are ordinarily of 3/16 in. thickness in plain copper-bearing steel, may be taken for examination. At the end of their useful life, they are reduced in thickness to such an extent that the remaining steel no longer has sufficient strength and failure cracks appear. The remaining thickness is not great, and 0.04 in. will be used for the purposes of this example. Thus, corrosion has removed 0.1475 in. of steel from the original thickness of 0.1875 in (3/16). It will be shown later that from the standpoint of strength, the high strength steel will permit a reduction in weight of about 25 per cent. It is not necessary to know what combination of stresses (or their actual amounts) existed in the copper-bearing steel at failure. If it was found to occur at a thickness of 0.04 in., the strength properties of a good high strength steel would permit it to hold out until reduced to 0.03 in. in thickness. Next the factor of corrosion resistance should be examined. Using the comparative factor given above of 1½ for the corrosion resistance rate of the high strength steel with respect to copper-bearing steel, and applying it to the 0.1475 in. thickness removed from the copper-bearing steel, a required thickness of 0.0983 in. is obtained. Adding this to the 0.03 in. obtained from the strength calculations, gives a total required thickness of 0.1283 in. Admittedly this is an approximate approach to the problem, but it leads to the thickness of ⅛ in. which was used in several thousand hopper cars now giving satisfactory service from the standpoint of life. It will be shown that this reduction of 33 1/3 per cent (3/16 in. thickness reduced to ⅛ in.) is well in line with the most favorable reduction made possible by the strength factor alone.

A most important conclusion to be drawn from the preceding discussion is that thickness reductions of this order are valid only if the corrosion resistance of the high strength steel *is* one and one-half times that of copper-bearing steel in hopper car service. Any ratio less than this would require the thickness to be increased, and thus reduce the weight saving.

The corrosion attack to which open-top railroad equipment is subjected is due almost entirely to the pollution of the air in industrial areas

by sulphur gases. This fact is borne out by the service history of the equipment. It is confirmed also by the proven increase of approximately 50 per cent in service life obtained from copper-bearing steel compared with that of plain steel. No other property of plain steel was affected by the addition of 0.20 per cent copper than that of its degree of corrosion resistance.

Sulphur Leachings

The concentrated leachings of high sulphur coal are extremely damaging to steel of any composition. If the service requirements of railroad equipment included the storage of high sulphur coal in open-top cars for periods of 30 days or longer, these leachings would be given time in which to concentrate and then cause a greatly accelerated rate of corrosion of the surfaces of the steel and also a piercing type of corrosion at points where the lumps of coal came in contact with the sheets. This latter form of corrosion would cause penetration through the sheets of the cars in a very short time. That no such condition is a serious factor in railroad service is again demonstrated by the useful life of 10 or 11 years obtained from the sheets of coal cars of plain carbon steel, and of 14 or 15 years in copper-bearing steel. It should be noted that this service life is again in the ratio of the corrosion resistance factors mentioned of 1 : 1½ for the two types of steel respectively, when employed in equal sections. Moreover, the best high strength steels are proving their superior life to be in the ratio of their added resistance to atmospheric corrosion, when compared to plain carbon and copper-bearing steels. Thus, the ratio of service life in equal section of plain steel, copper-bearing steel, and high strength steel is respectively: 1 : 1½ : 2¼.

The most highly polluted atmospheres are found in industrial areas. Atmospheric corrosion attack is much more severe in these areas than in rural areas. Corrosion attack is accelerated by maritime atmospheres also, but not to the same extent as by industrial atmospheres. In support of the findings of corrosion experts in this country, the following excerpts from a report made by Dr. J. C. Hudson of the Corrosion Committee of the British Iron & Steel Institute will be found interesting:

"The exposure station (for test specimens) at Sheffield is situated in the heart of the industrial district and the atmosphere there is very corrosive. By this standard the corrosion rates at other home stations are low. . . .

"Other industrial atmospheres, Motherwell, Redcar and Woolwich, are only half so corrosive as Sheffield. Here, although the atmospheres are correctly described as 'industrial', the actual sites were situated on the fringe of the industrial activity, rather than in its center, in a zone where, as is frequently the case, there is a rapid transition from industrial plant to open country.

"Corrosion in the marine atmosphere of Calshot was less than 40 per cent of that at Sheffield. Since the specimens were exposed at the edge of the spit and were exposed at times to salt spray, it may be concluded that, although proximity to the sea may lead to severe corrosion in certain cases, in general sea salts are not so corrosive as the markedly acid conditions which result from severe industrial pollution of the atmosphere, chiefly by sulphur compounds.

"It may be concluded from the above that, as a rule, straight forward corrosion of iron and steel should not be marked in nonindustrial atmospheres, and that the primary cause of severe corrosion is industrial pollution."

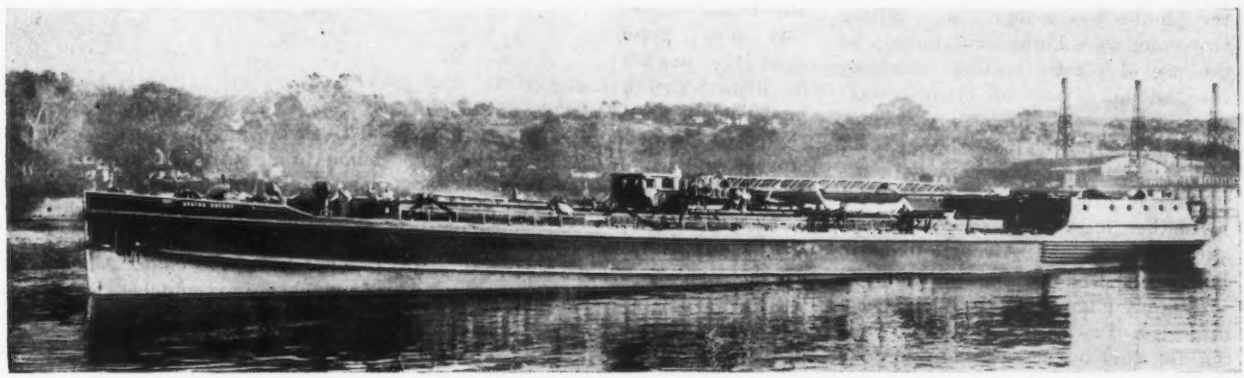
Mechanical Properties

The physical or mechanical properties of the high strength steels may now be compared with those of ordinary structural steels which have long held a prominent place in the construction industries, and naturally form a basis against which to evaluate the performance of the high strength steels. This is done in the accompanying table.

From an engineering standpoint, the most significant physical property of the subject group of steels, aside from their corrosion resistance and excellent endurance strength, is their high yield point. This latter property owes its importance to the general design practice of basing unit working stresses upon the yield point.

The working unit stress is determined by dividing the yield point by a factor of safety. Everyday methods of stress analysis are not exact, as they seldom include the calculation of secondary stresses, the influence of stress concentrations and accidental overloading of the structure. Long experience with ordinary steel has determined a certain factor of safety which produces satisfactory results. The factor varies for different classes of structures, and the higher its value, the greater would appear to be the uncertainty of the true state

(CONTINUED ON PAGE 124)



THIS tanker operates both in sea water and brackish fresh water. After the first ten years service the entire middle body, which was constructed of standard ship steel, had to be replaced. Plates of corrosion resistant, high strength steel used in the reconstruction eight years ago are still in excellent condition. Built by Federal Shipbuilding & Dry Dock Co., Kearny, N. J.

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Plastic Coatings

Protect Carbide Tipped Tools

• • • In addition to protection against corrosion, plastic dip coatings are finding use as a means of cushioning tools and machined parts from chipping and abrasion while in the storage crib or in transport. It is another method of packaging the products.

By BERNARD GOULD
Aeroil Burner Co., Inc., West New York, N. J.

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ALTHOUGH strippable plastic coatings have been in use for over a year in connection with protection of metal parts in overseas shipments, it was only a short time ago that a prominent engineering company in Buffalo started to test the applicability of plastics to the protection of tools, dies and gages kept in the plant's tool cribs. The resulting economies were highly satisfactory as the use of plastic coatings not only resulted in saving of critical tools from injury while in the stock bins but also permitted the shipment of tools to ultimate consumers with assurance of protection en route.

Another interesting application instituted at the Bell Aircraft plant in Buffalo is that of identification to show that gages and tools had been inspected. Prior to the use of a coating for this purpose, Bell inspectors made weekly trips through gage and tool cribs checking on the parts. Today, the gages are plastic dipped in the gage inspection department before being forwarded to the cribs. Inspectors now merely open the drawers for instant visual assurance that tools have been inspected. Gages not plastic coated are immediately removed from storage and sent to the inspection department for rechecking.

An added factor of economy is that the strippings are reclaimable to a great extent. Stripped coatings can be deposited in the plant's own melting tank, and since only occasional addition of new compound is needed to rejuvenate the melt there is relatively low total compound consumption.

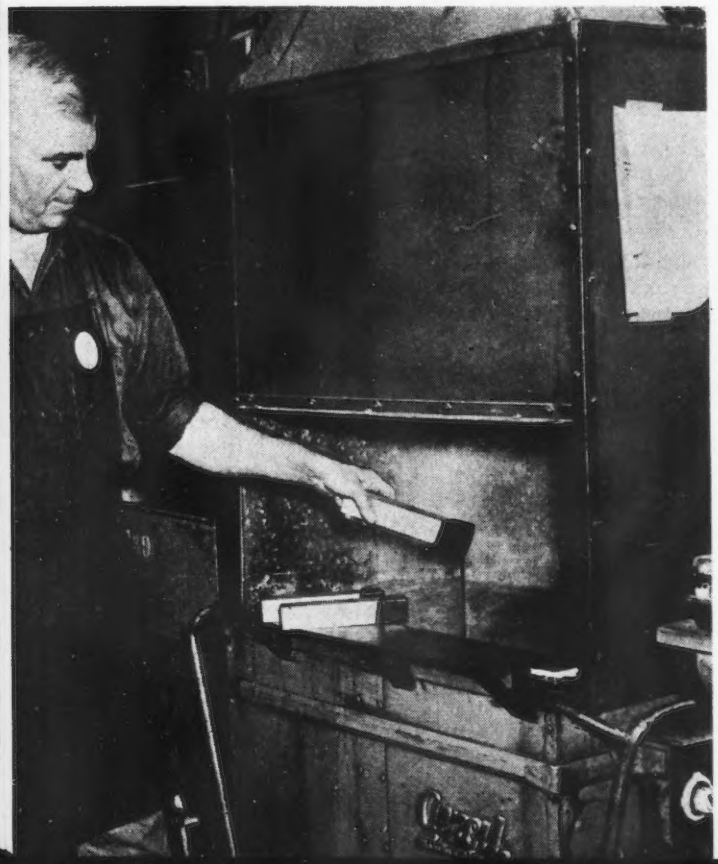

FIG. 1 — A plastic coating being formed over cutting edge of carbide tool after dip for period of 3 to 5 sec. in tank containing the melted plastic.

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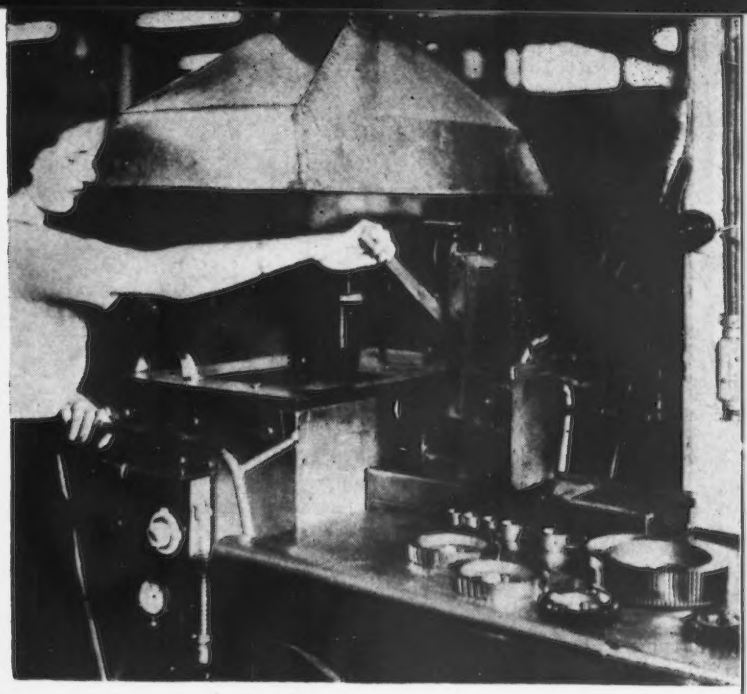
Plastic strip or plastic "skin" protective coatings have as their base one of two plastics: ethyl cellulose or cellulose acetate butyrate. Compounds of the former class are usually opaque or translucent and are applied at temperatures of 375 deg. F. Compounds featuring cellulose acetate butyrate as a base have a slightly yellowish cast but are otherwise transparent enough to enable the reading of punched part numbers and other identifying markings through the coating without difficulty. These compounds are applied at temperatures in the vicinity of 300 deg. F. In both cases, the plastic strip coatings have little or no heat conductivity, and for proper heating and melting the use of specially designed equipment is advisable.

The coating is applied to metal parts in a 3 to 5 sec. dip (Fig. 1), and cools rapidly. It contracts over the part forming a corrosion-proof covering with a high resistance to abrasion. When the part is ready for use, this plastic skin can be peeled off as simply as one would a banana skin, leaving the part ready for instant use (Fig. 2).

Although larger melting tanks for volume production in connection with overseas shipments have already been on the market, heating equipment manufacturers have recently begun to concentrate on the production of smaller models which would provide greater efficiency for coating tools, gages, dies and other parts of small dimensions.

Among Plast-O-Dip tank models manufactured by the Aeroil Burner Co., Park Avenue at 57th Street, West New York, N. J., are handy bench-type models, as well as large sizes



ABOVE

FIG. 3—Set-up for coating gear shaper cutter edges at Fellow Gear Shaper Co. Note motor which rotates gear when lowered into tank.

LEFT

FIG. 2—Removing plastic coat which protects carbide tip of tool before use.

Figs. 1 and 2—courtesy of Wendt-Sonis Co.

used in automatic conveyor setups.

In Fig. 3 is illustrated a special mechanism which was devised by the Fellows Gear Shaper Co., Springfield, Vt., and is attached to a standard Aeroil plastic dip tank. This accessory automatically dips the teeth only of gear shaper cutters as it is this part of the product which requires protection.

The adaptation of a conveyor assembly for plastic dipping by Food Machinery Corp., Riverside, Calif, is shown in Fig. 4. Tools are dipped automatically and carried away to the shipping department where the tools are stored in stock bins. Acording to this company, costs have been reduced as much as 50 per cent in some cases, against the former methods of wrapping and waxing.

RIGHT

FIG. 4 — Plastic dipping of hand tools in an automatic conveyor arrangement at Food Machinery Corp.

o o o

LEFT

FIG. 5—Bench type plastic dip tank specifically developed for toolroom use, for coating small carbide tools, cutting edges, taps and dies.

Prefabricated Snap-Assembly Construction

A NEW prefabricated light metal construction, based on a snap-assembly method which requires no bolts, screws, rivets or welds, has been announced by Lindsay & Lindsay, Chicago. Known as Struc-Lok, this type of construction has been developed by the company to complement its other product, Lindsay Structure, and to extend the advantages of prefabricated metal assembly to a much broader field, which includes light machinery housings, furnace and air-conditioning casings, storage bins and shelving, cabinets for electrical equipment, and other applications where lighter weights are requisite and strength requirements are correspondingly lower.

Lindsay Struc-Lok consists of only three basic parts: framing, sheets, and fittings. All parts are accurately die-formed by mass production methods in a wide variety of sizes, Fig. 1. Assembly can be easily handled by men or women without special training, as all of the parts snap together by hand. The basic principle of Lindsay Struc-Lok assembly is as follows: Special fittings connect the framing and hold it together while the flanged edges of the sheets are snapped into die-rolled frame channels, Figs. 2 and 3. As the edges of the sheets snap into place they lock the framing and sheets permanently into position, providing an unusually strong lightweight unit with no space sacrificed for reinforcing braces, Fig. 4.

Lindsay Struc-Lok is now available with 26 and 24 gage mild steel sheet. Perforated or expanded metal sheets may also be used. Openings, louvres, doors and other conventional construc-

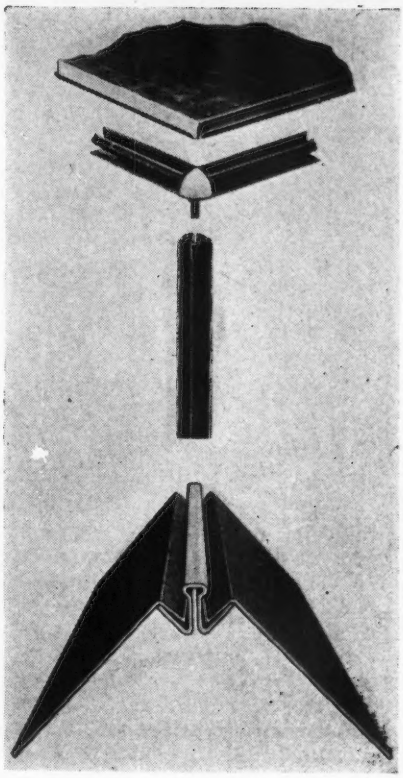


FIG. 2—Close-up of Lindsay Struc-Lok assembly, showing how die-formed edges of panel sheets lock permanently into die-rolled frame channels.

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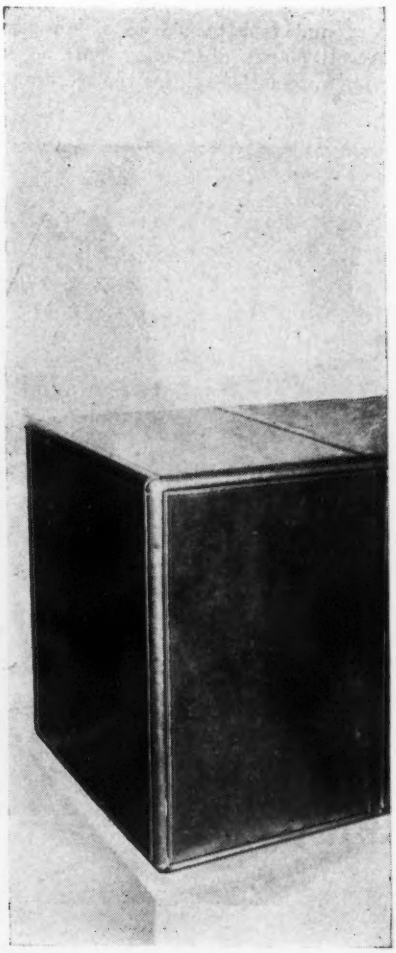
FIG. 1—Although three basic elements are utilized in the Lindsay Struc-Lok system, a large range of prefabricated metal structures can be assembled.



tion details are easily incorporated, and provision is made for using the framing to support shelving, hooks, machines, or other equipment. Corner caps and decorative molding, which also snap easily and permanently into place, give the completed Struc-Lok unit a machine-finished appearance, as shown in Figure five.

RIGHT

FIG. 3—Special fittings connect the framing and hold it together while the sheets are installed.

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BELOW

FIG. 5—Decorative molding is snapped in place to give completed Struc-Lok assembly machine-finished appearance.

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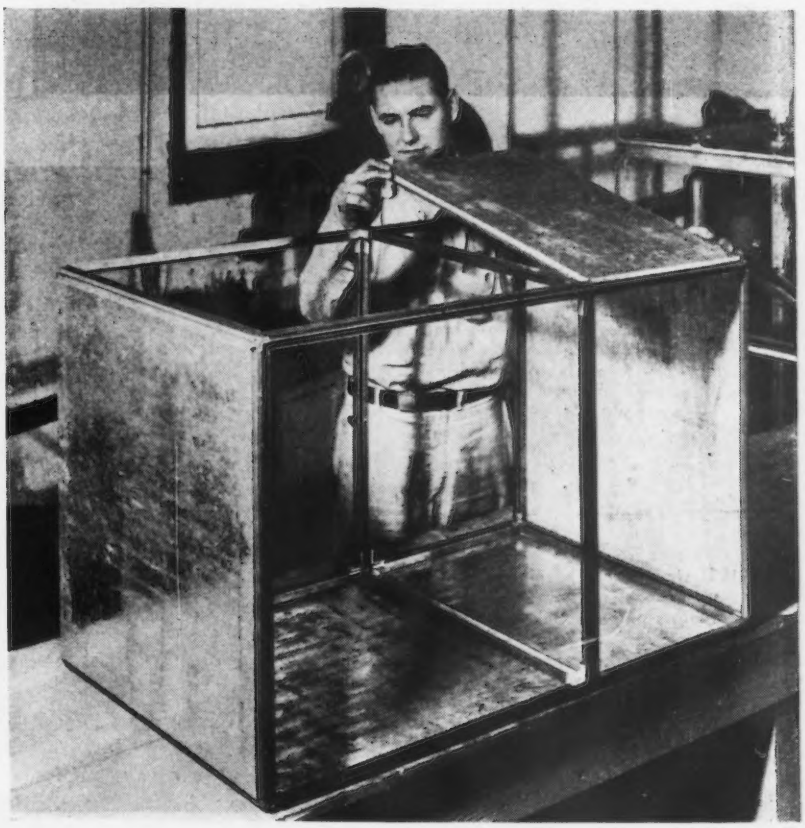
BELOW

FIG. 4—Slight pressure snaps the flanged edges of the panel sheets into the frame channels. As the edges of the sheets snap into place they lock the framing and sheets permanently into position.



Shot Peened

GREATER resistance to fatigue and corrosion is reported for aircraft engine connecting rods produced by Studebaker Corp. for the Wright engine. Rods are first precisely shot peened in especially designed, in-line cabinets and then lacquered. The peening of metal by the repeated impact of fine shot pellets strengthens exterior surfaces. Lacquering closes over indentations made by the shot and contributes two advantages over the former highly polished connecting rod: Surfaces are now protected against the corrosive acid of perspiring hands in engine assembly and at parts repair depots and possibilities of corrosion are also reduced during the first few hours of aircraft flight, before surfaces become coated with a natural oil lacquer.

The Studebaker process departs materially from some of the other methods of shot peening. The most common industrial practice, popular in the treatment of automobile springs and crankshafts, has been shot bombardment from a revolving wheel. The peening apparatus in the Studebaker connecting rod procedure consists of clusters of double-throated injection nozzles arranged to aim at various angles. Metered shot is fed by gravity down one throat while 100

ABOVE

SUB-ASSEMBLY of master and articulated rods with the crankshaft is checked before being sent to the final assembly line at Studebaker-South Bend. The rods are lacquered in striking maroon and golden red colors.

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RIGHT

FIRST step in shot peening aircraft engine connecting rods at the Studebaker parts plant in Chicago. Bores of articulated rods are fitted with plugs to protect them while channels and sides are treated on the chain conveyor running through the peening cabinet.

Connecting Rods

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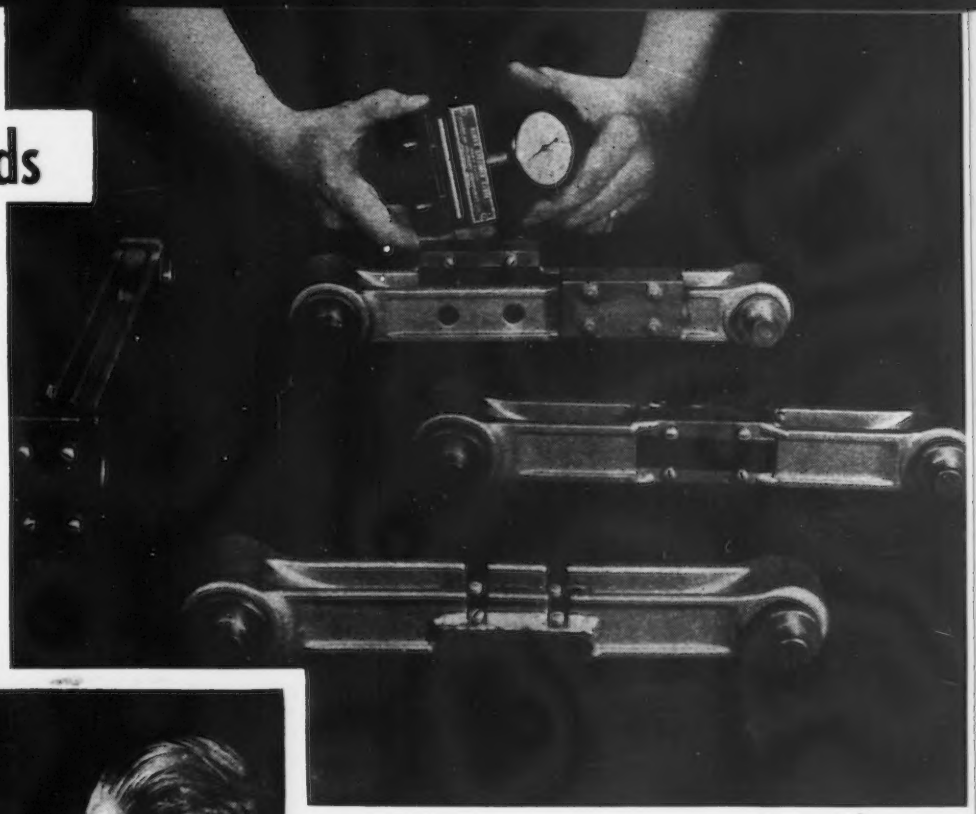

BELOW

KEY to the precise control of Studebaker's novel method of shot peening connecting rods are clusters of double-throated shot injector nozzles. Metered shot is fed by gravity down the larger tube. The air blast enters through the smaller hose. In this cabinet one side of the upper flat surfaces and inside channel surfaces of the master rod are peened while the part is slowly rotated.

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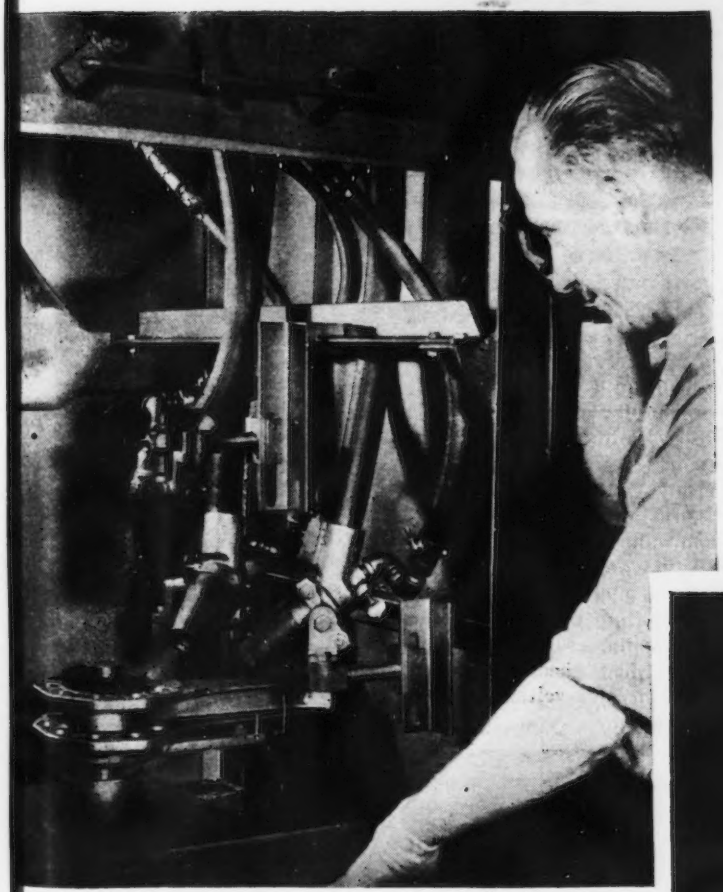

ABOVE

EVERY 2 hr. dummy aircraft connecting rods are shot peened at the Studebaker Chicago plant to check the accuracy of the process. A thin metal strip is first attached to the rod and the part put through the process. Because it is peened on only one surface, the strip will develop a decided arc when released from the rod. By measuring the extent of this arc on an Almen specimen gage, inspectors can tell the intensity of the peen. The above photograph illustrates how the strips are fastened at various locations on the articulated rods.

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RIGHT

THE articulated rod enters a third shot peening cabinet. Note that the piece is placed crossways of the conveyor platens instead of longitudinally. This step peens the curvature of the rod ends.

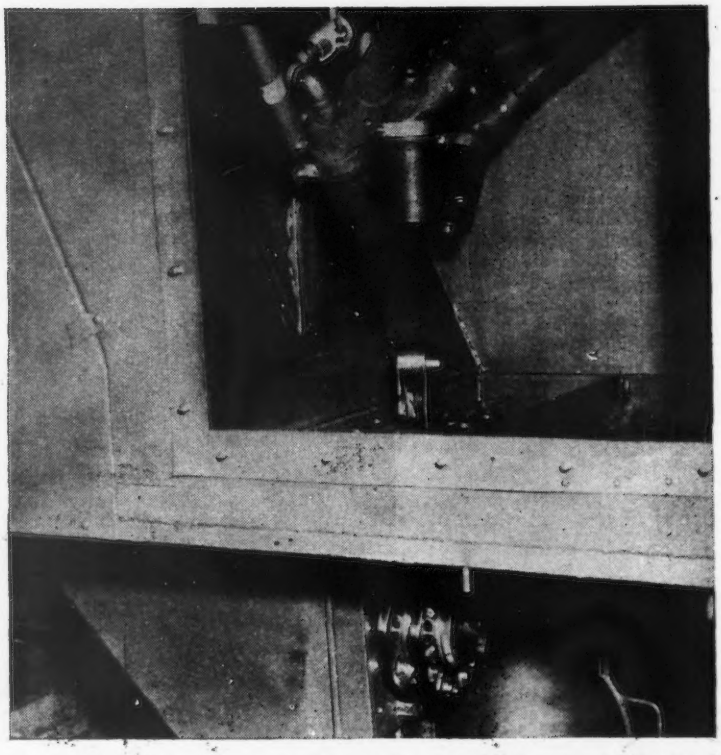
lb. of air pressure issues from the second throat.

Separate conveyor systems and shot peening cabinets have been constructed for the master and articulated rods. Fundamentally the systems are the same but because of more complicated contours, the master rod undergoes partial treatment in individual peening cabinets.

Passing through enclosed peening cabinets on a conveyor, the rods are turned by hand between cabinets in order that all sides and ends can be reached by the shot. Bearing, wrist pin and knuckle pin bores are meantime shielded by special fitments.

Each articulated rod is subjected to the impact of 89 lb. of 0.028 in. shot during its trip on the conveyor. Master rods receive 450 lb. of shot. Cams attached to the peening plates open and close nozzles at exact points so as to conserve shot and air power. Shot is automatically returned to a bin at the top of the cabinets where it is cleaned and sorted to uniform size, then dropped into cups feeding the aspirator tubes.

Following shot peening, the rods are hand washed, dried and masked for the lacquer spray. During all operations, prior to lacquering, gloves are worn to insure against perspiration acid corrosion.



IN the above step, the curved surface at the end of the master rod is peened as the part is automatically pushed into path of the shot.

While the shot peening process eliminates some of the final polishing and obviously reduces connecting rod labor, this was not the prime motive behind the development. Studebaker was seeking a practical production method of shot peening rods. That it wound up with other advances was merely coincidental.

Rugged X-Ray Tube for Portable Service

IN order to examine internal structure of welds, rivets and other vital points of stress in confined spaces such as airplane wings, fuel tanks, etc., North American Philips Co., New York, recently introduced the X-ray unit illustrated which is now at work in several aircraft plants.

The shockproof tube (approximately 3 in. in diameter) is coupled to the generator by means of a flexible cable and two small water hoses. Water cooling makes possible the compact design so useful for analysis on completed structures.

In use, the X-ray tube is clamped to or held against the section under examination. Standard X-ray film is then placed on the opposite side of the area and the exposure is made. The high-loading anode tubes are available with targets of copper, cobalt, iron or molybdenum. Ratings range from 10 to 20 ma. at potentials up to 50 kvp., depending on the target material.

The main generator may be in a fired location or mounted on a dolly for movement to certain stations where electrical and water connections are available. It may also be assigned to a fixed location where parts are brought within reach of the tube.

Controls include a stepless kilovoltage regulator, filament rheostat, circuit breaker and a high-voltage pushbutton switch. A milliammeter is provided for proper adjustment of tube current and a running-time meter records tube life. The pilot light shows when the tube is energized. There is an outlet to permit use of an exposure timer.

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THIS 3 in. diameter water-cooled X-ray tube can be clamped against the object to be examined such as an airplane wing, but is obviously not held in the hands when energized.

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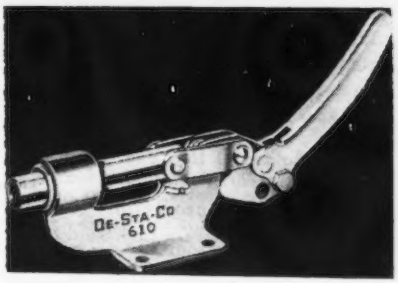
New Equipment . . .

Small Tools

. . . Recent developments in fastening devices, markers and holding fixtures are described on this page.

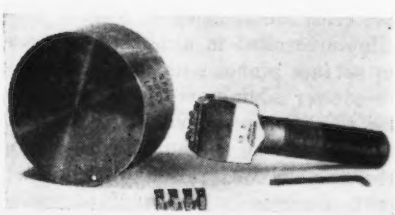
KNOWN as the De-Sta-Co Model 610, a "push and pull" lock clamp for heavy duty work has been announced by *Detroit Stamping Co.*,



345 Midland Avenue, Detroit 3. The clamp weighs 1½ lb., has an overall length of 6¾ in. and plunger rod travel of 1½ in. The rod is tapped to receive a ⅜ in.-16 standard threaded bolt.

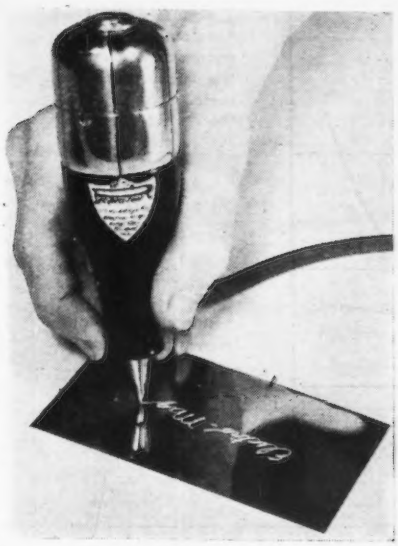
Convex Marker

A CONVEX marker for stamping round bars has been designed by *New Method Steel Stamps Inc.*, 147 Jos. Campau, Detroit 7. Interchangeable steel type, held in place by two set screws, are tapered in such a fashion that when assembled in the type retaining mortise together with wedges, a predetermined radius is automatically formed by the sharp marking surfaces of the stamps. In the four character convex marker illustrated, the stamps form a 2 in. radius for the marking of 4 in. bars. Devices having different radii and character capacity can be made to suit individual requirements.



Hand Engraving Tool

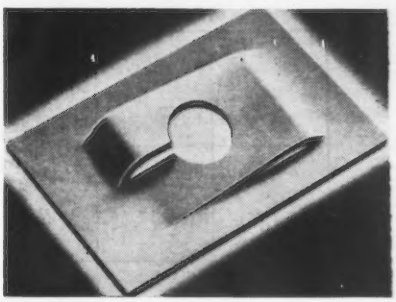
AN electro magnet reciprocating hand tool for free hand or pantographic engraving on metals, plastics, ceramics, wood and glass has been announced by *Electro-Mag. Mfg. Co.*, 610 North Rockford Avenue, Rockford, Ill. The tool is suited for engraving letters, numbers or symbols on equipment or parts which cannot be



worked with metal stamps or because of nonconductivity are unsuitable for electric etching. The cylindrical coil is mounted on conical projections of the magnetic circuit which engage its inner surface and restrain it from vibrating by constantly holding it under tension in order to cut down coil failure. Weight of the entire unit which is 5⅜ in. in length is 14 oz. complete. The standard tool operates on 110 volts 60 cycle a.c. current and delivers 7200 power strokes per min. Standard units are equipped with an alloy engraving bit for materials under the equivalent of 50 Rockwell C hardness. A diamond tipped bit is available for harder material.

Lock Nut

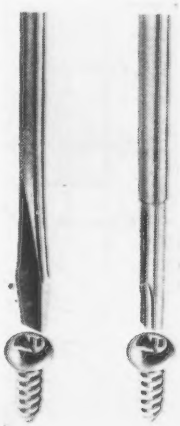
A SELF-LOCKING sheet metal fastener, Stalock, has been announced by *Adel Products Corp.*, Burbank, Calif. It is a one piece, resilient, spring steel stamping which



grips screw threads all around with full 360 deg. engagement. It is available in a variety of sizes and types.

Recessed Head Screws

RECESSED head screws operative either with an ordinary screw driver blade of proper width or with a special driving bit for assembly work have been announced by *United Screw & Bolt Corp.*, 2513 West Cullerton Street, Chicago 8. Produced under the trade name "Clutch Head" the screw features a frictional lock design which unites the screw to the driver bit where it remains in position until automatically released by the power of driving. Three sizes of bits cover the popular range of standard machine, wood and thread forming screws. A 103 deg. opening facilitates entry.



Improving the Weldability Of High

By S. I. HOYT, C. E. SIMS
and
H. M. BANTA
Battelle Memorial Institute

THE advantageous effect of a high-aluminum content with respect to crack sensitivity and the possible difficulty from pinholes in the weld bead have been discussed in a previous section of this report. Since it is also known that the sulphur content of the base metal contributes to the formation of pinholes, it was considered advisable to investigate the combined effect of sulphur and aluminum contents upon porosity and crack sensitivity.

For this part of the program, a series of five 300 lb. SAE 4130 induction furnace heats were made with sulphur contents ranging from 0.012 to 0.047 per cent (see analysis in Table XIX). The sulphur content of these heats was controlled by the choice of the scrap so that all of the sulphur would be present as a residual element. Each of these five heats was split six ways, the six ingots being deoxidized with the following aluminum additions: 0, 0.015, 0.05, 0.10, 0.20, and 0.30 per cent which ranges from 0 to 6 lb. per ton. All aluminum additions were made to the furnace in order to insure uniform distribution.

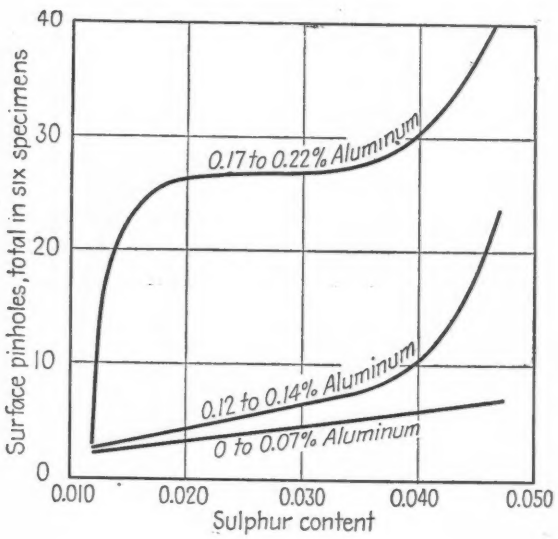
The 30 ingots from these five heats were processed as follows:

(1) Hot rolled to 3/16 in. gage.
(2) Annealed at 1300 deg. F. for 5 hr.
(3) Cold rolled to 0.170 in. gage.
(4) Normalized at 1600 deg. F. for 1 hr.
(5) Drawn at 900 deg. F. for 1 hr.

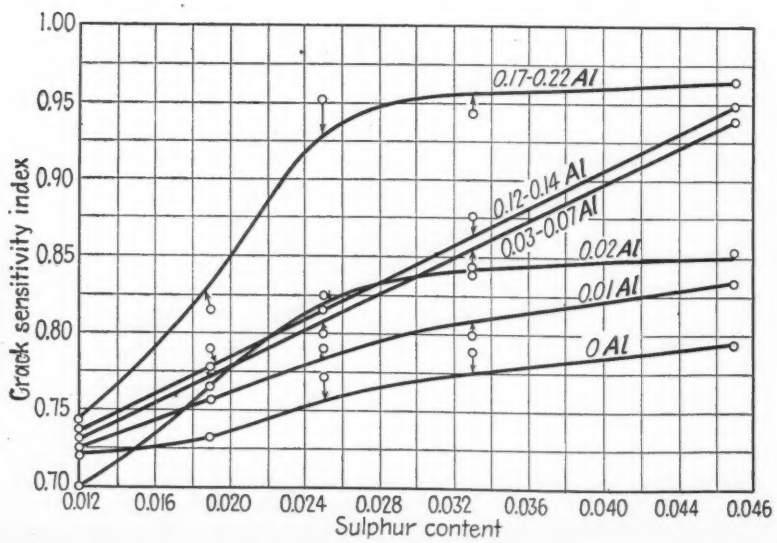
After the above processing, the 2 x 2 in. specimens used for the weld tests were ground to 0.125 in. gage, approximately the same amount of metal being removed from each side of the plate. The purpose of this latter step was to remove any surface conditions which might influence the test results.

For testing these steels, the circular bead crack sensitivity test was selected because it could be used for determining both the effect of the base metal analysis upon the porosity of the deposited metal and the crack sensitivity. The standard practice was followed by making six tests on each steel. The surfaces of the beads were examined and the pinholes counted before the specimens were ground. No porosity was observed below the extent of the surface pinholes. The data are shown graphically in Fig. 25.

These data show that as much as 6 lb. of aluminum per ton may be added, resulting in an acid soluble content of 0.17 to 0.22 per cent in the steel, without any increase in the porosity, provided the sulphur content is 0.012 per cent or lower. When the sulphur content is increased to 0.018 per cent, the addition of 6 lb. of aluminum resulted in a marked increase in surface pinholes as compared with the lower aluminum steels. A similar condition was found in 0.026 and 0.035 per cent sulphur steels. When the sulphur was raised to 0.047 per cent, abnormally high surface poros-



LEFT
FIG. 25—Effect of sulphur and aluminum contents upon the occurrence of surface pinholes in the weld-deposited metal.



BELOW
FIG. 26—Effect of sulphur and aluminum on crack sensitivity.

Strength, Low Alloy Steels ▲ ▲ ▲

ity was encountered with aluminum additions of 4 lb. per ton.

Obviously, these data reveal that both sulphur and aluminum contribute to surface pinhole porosity. But the amount of these elements required to cause abnormal pinhole trouble is considerably in excess of the amount which would be found even in an extremely high-aluminum steel, such as an SAE 4130 steel made with 3 lb. of aluminum per ton.

Crack Sensitivity

After examining the test specimens for surface pinholes, the crack-sensitivity tests were completed in the usual manner with the exception that during and after grinding the beads were inspected for deep-seated porosity. Only surface pinholes were found. A summary of the crack-sensitivity results are illustrated graphically in Fig. 26.

The results of these tests were somewhat unexpected in view of the generally accepted assumption that sulphur is always detrimental with respect to welding. From Fig. 26, it is observed that in this specific series of steels the weld-crack sensitivity actually decreases with increased sulphur content. This decrease in sensitivity with higher sulphur is more pronounced in the higher aluminum steels.

This improvement in crack-sensitivity seems to be in agreement with other information developed in this investigation since sulphur exerts some influences similar to that of aluminum. For example, sulphur is a definite aid in producing fine grain size, together with the accompanying "abnormal" carbide structure. Sulphur is also known to be a mild deoxidizer.

Effect of Postheating

It has been indicated previously that under certain conditions postheating may exert a beneficial effect on occurrence of cracks due to welding and may influence appreciably the hardness developed in the heat-affected zone. In order to reduce this relationship to measurable terms, a quantitative study was made of crack

. . . Contrary to popular belief, crack-sensitivity of SAE 4130 steel is improved with increases in sulphur content because of its secondary effects. A study of postheating indicates that the conditions that give the most favorable results are those corresponding to the conditions in the S curve which are most favorable to the formation of bainite. The investigation was sponsored by the Office of Production Research and Development of the WPB. This is the third and concluding article of the series.

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sensitivity and hardness as functions of carefully controlled preheating and postheating cycles.

The effect of postheating conditions upon the extent of cracking was investigated by making circular bead-crack sensitivity tests on the sensitive steel No. 581. The tests were made using the standard procedure with the exception that the jig was modified by the addition of electric elements and a control system for maintaining the desired postheating temperature. The preheat was regarded only as a means of starting the postheating at the desired value and, so far as could be determined, does not have any other influence on the welding results.

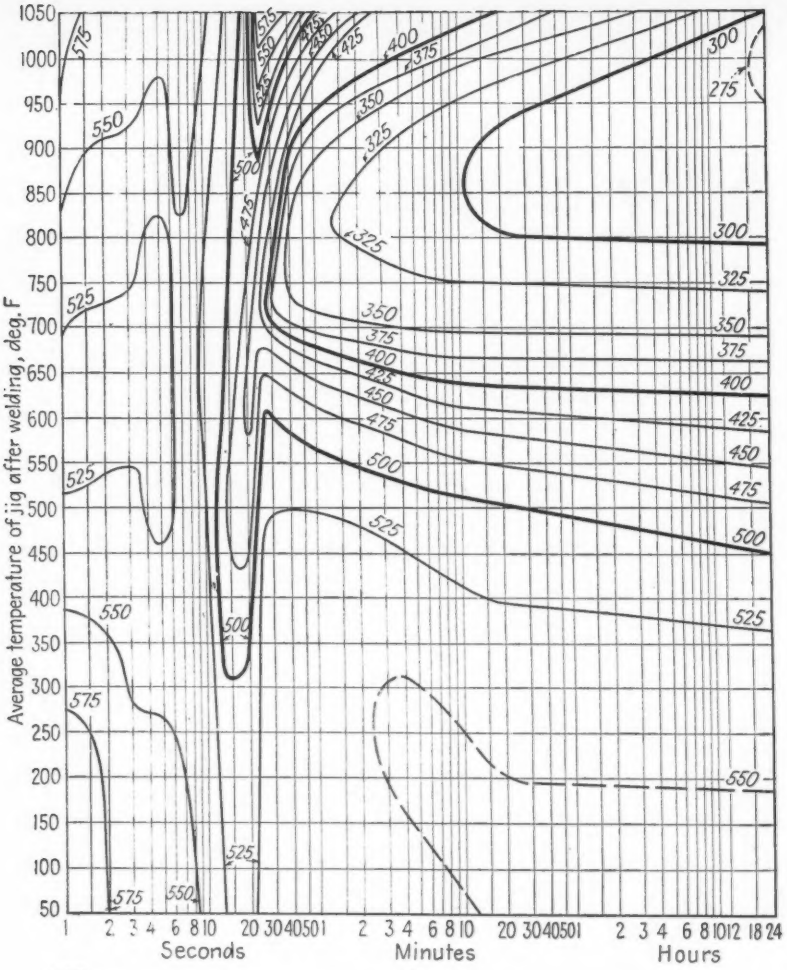
Postheating conditions, ranging

TABLE XIX

Chemical Analysis of Experimental Steels Used for Studying the Effect of Sulphur and Aluminum

Heat No.	Ingot No.	C	Mn	P	S	Si	Cr	Mo	Al*
10661	1	0.32	0.57	.013	0.012	0.23	0.99	0.20	0.01
10661	2	0.32	....	....	0.012	....	....	....	0.01
10661	3	0.32	....	....	0.012	....	....	....	0.02
10661	4	0.33	....	....	0.012	....	....	....	0.04
10661	5	0.32	....	....	0.012	....	....	....	0.12
10661	6	0.33	....	....	0.012	....	....	....	0.18
10662	1	0.32	0.55	.015	0.018	0.25	0.95	0.21	0.01
10662	2	0.32	....	....	0.018	....	....	....	0.01
10662	3	0.32	....	....	0.019	....	....	....	0.02
10662	4	0.33	....	....	0.019	....	....	....	0.07
10662	5	0.31	....	....	0.019	....	....	....	0.13
10662	6	0.32	....	....	0.019	....	....	....	0.21
10663	1	0.33	0.48	.016	0.025	0.25	0.96	0.20	0.01
10663	2	0.32	....	....	0.025	....	....	....	0.01
10663	3	0.31	....	....	0.025	....	....	....	0.02
10663	4	0.31	....	....	0.024	....	....	....	0.07
10663	5	0.31	....	....	0.027	....	....	....	0.14
10663	6	0.30	....	....	0.026	....	....	....	0.22
10664	1	0.31	0.58	.016	0.031	0.26	1.01	0.20	0.01
10664	2	0.31	....	....	0.035	....	....	....	0.01
10664	3	0.30	....	....	0.037	....	....	....	0.02
10664	4	0.30	....	....	0.032	....	....	....	0.06
10664	5	0.29	....	....	0.032	....	....	....	0.14
10664	6	0.30	....	....	0.031	....	....	....	0.20
10665	1	0.31	0.53	.015	0.046	0.27	0.97	0.21	0.01
10665	2	0.31	....	....	0.046	....	....	....	0.01
10665	3	0.31	....	....	0.046	....	....	....	0.02
10665	4	0.32	....	....	0.047	....	....	....	0.03
10665	5	0.31	....	....	0.047	....	....	....	0.12
10665	6	0.31	....	....	0.047	....	....	....	0.17

* Acid-soluble aluminum.



from room temperature to 1000 deg. F. in steps of approximately 100 deg. and time intervals of 1 sec. to 24 hr. were investigated. The time range was covered in 17 steps selected to give the maximum accuracy in the range of rapidly changing properties. In the case of the short postheating cycles, the entire cycle was carried out in the jig. For the longer postheating intervals, the specimens were quickly transferred from the jig to salt or oil pot furnaces at the desired temperature. Upon completion of the cycle, the specimens were quenched as previously described. As in all previous crack-sensitivity tests, six duplicate specimens were made for each condition studied.

Effect on Hardness

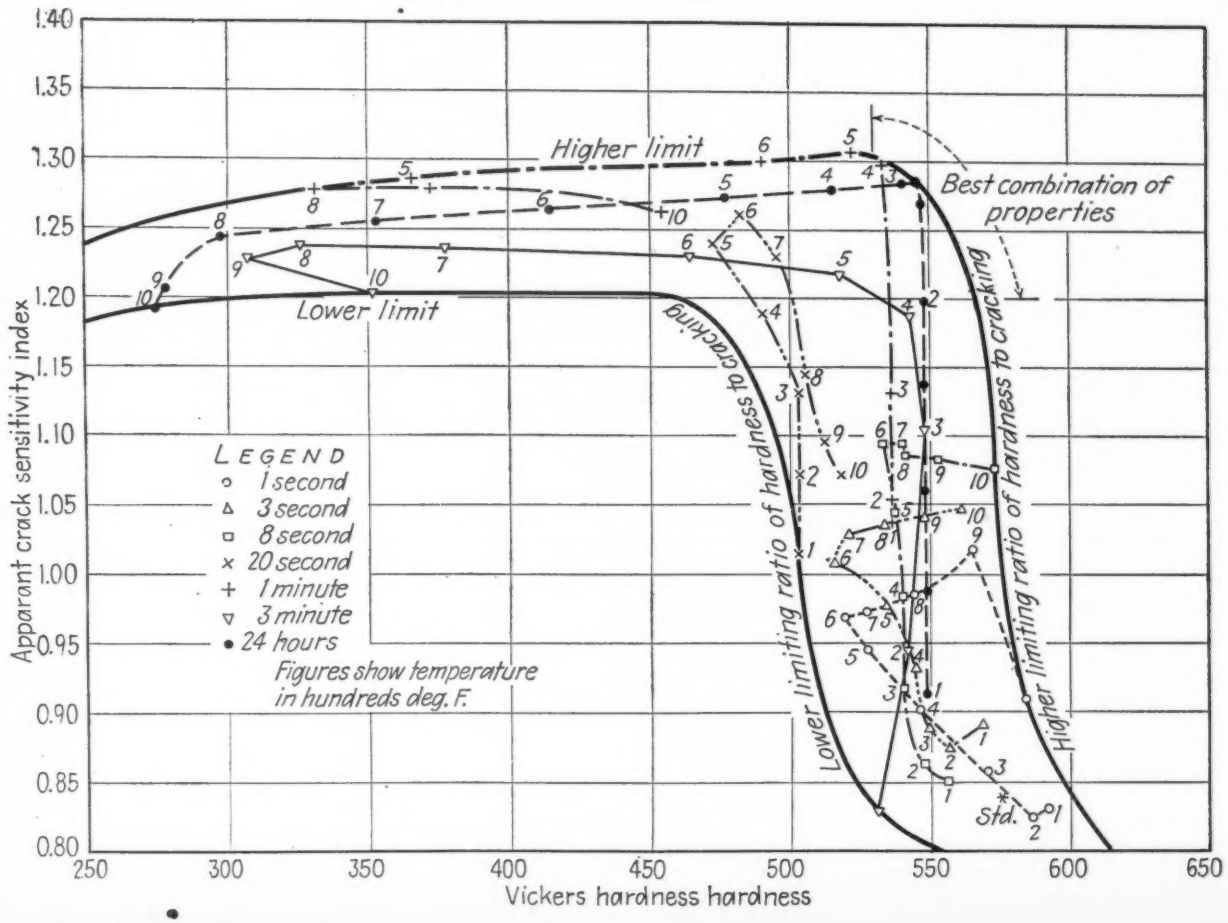
A hardness survey was made on one specimen from each of the 170 differ-

LEFT

FIG. 27—Contours of equal Vickers hardness number vs. average temperature of jig.

BELOW

FIG. 28—Apparent crack sensitivity index related to maximum Vickers hardness numbers in the heat-affected zone.



ent postheating conditions investigated and the maximum hardness in the heat-affected zone recorded. The data from these hardness studies were plotted in the form of isohardness curves, or curves of equal hardness obtained under different postheat conditions, Fig. 27. The most interesting feature of this figure is the region of minimum hardness extending outward from 10 min. between 800 and 1050 deg. F., which is obviously due to the formation of bainite. It will also be noted that the hardness increases for postheats above about 800 deg. and that a very marked increase occurs near 30 sec. on the abscissa and 1000 deg. on the ordinate.

While it is obvious there is a correlation between hardness and cracking, this work reveals there are certain definite limitations to this relationship. In Fig. 28, the apparent crack-sensitivity index values (the index values obtained with the various conditions of postheat) are plotted against the maximum Vickers' hardness values in the heat-affected zone. This figure shows that below about 460 VHN the crack-sensitivity is uniformly low (index values from 1.2 to 1.3) which means that all welds in this hardness range would be completely free of cracks.

In the hardness range of 500 to 575 VHN, the apparent crack-sensitivity index varies anywhere from 0.80 to 1.30, from very sensitive to extremely insensitive. Therefore, in this range, hardness alone cannot be used to predict the degree of cracking. Any hardness values above 575 VHN can be accepted as proof that extensive cracking will be encountered with this steel.

Microstructure

A limited number of micrographs were made to determine the structures associated with the various postheat treatments. Ten of these structures are shown in Figs. 29 to 33. Five of the photographs show the results of incomplete transformations after 3 min. of postheating at the temperatures indicated. For comparison, the structures obtained by a 24 hr. postheat are included, the temperatures being the same as in the 3 min. series, approximately 100, 300, 500, 800, and 1000 deg. F.

The first five structures will be recognized as martensite of varying quality, all five having hardness values above 500 VHN. However, only the structures in Fig. 29 and 29a cracked badly. The structure in Fig. 30 cracked moderately, while the structures in Figs. 30a and 31 were practically free of cracks. A close

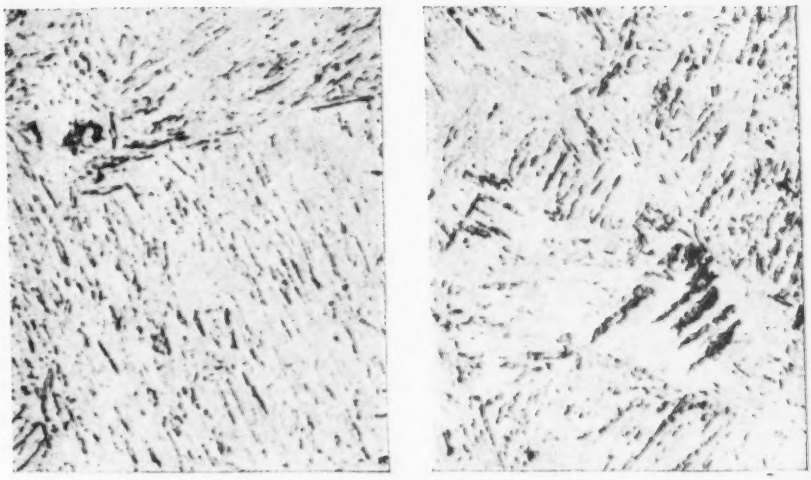


FIG. 29 (Left)—Alpha martensite plus residual austenite. Postheat 3 min. 197/137 deg. F., VHN 519-536. Improvement in sensitivity index + 0.028. (Right) Alpha martensite. Postheat 24 hr. at 102 deg. F., VHN 523-548. Improvement in sensitivity index + 0.076.

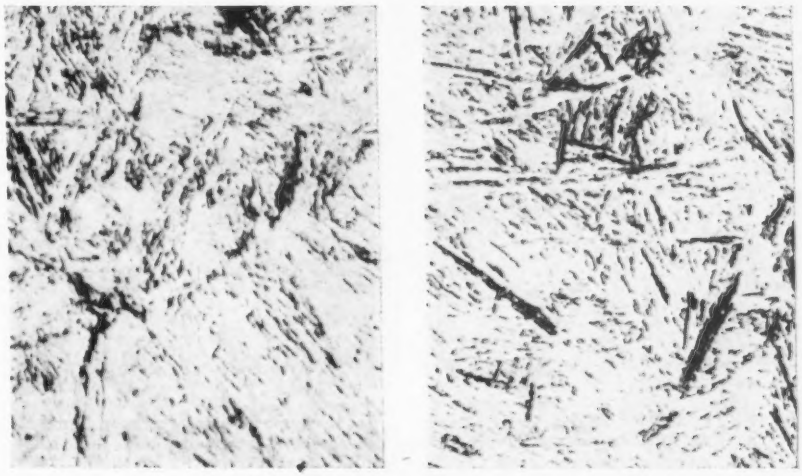


FIG. 30 (Left)—Beta martensite with trace of alpha martensite. Postheat 3 min. 321/387 deg. F., VHN 514-548. Improvement in sensitivity index + 0.298. (Right) Beta martensite. Postheat 24 hr. at 315 deg. F., VHN 506-536. Improvement in sensitivity index + 0.48.

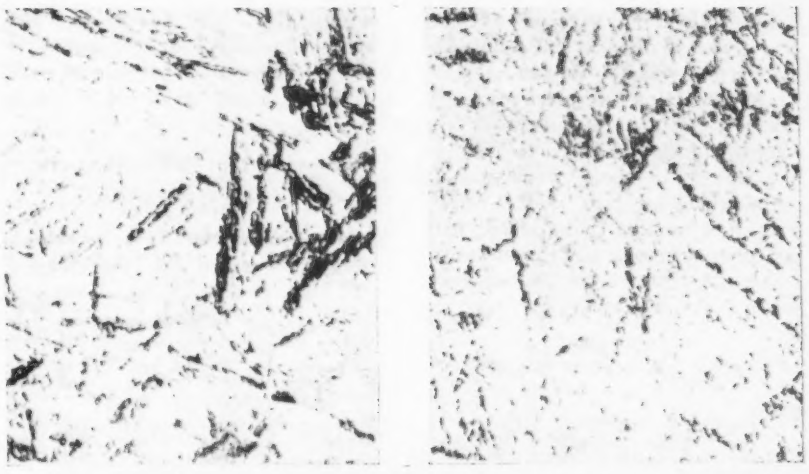


FIG. 31 (Left)—Beta martensite. Postheat 3 min. 513/570 deg. F., VHN 502-519. Improvement in sensitivity index + 0.298. (Right) Troostite. Postheat 24 hr. at 515 deg. F., VHN 438-468. Improvement in sensitivity index + 0.416.

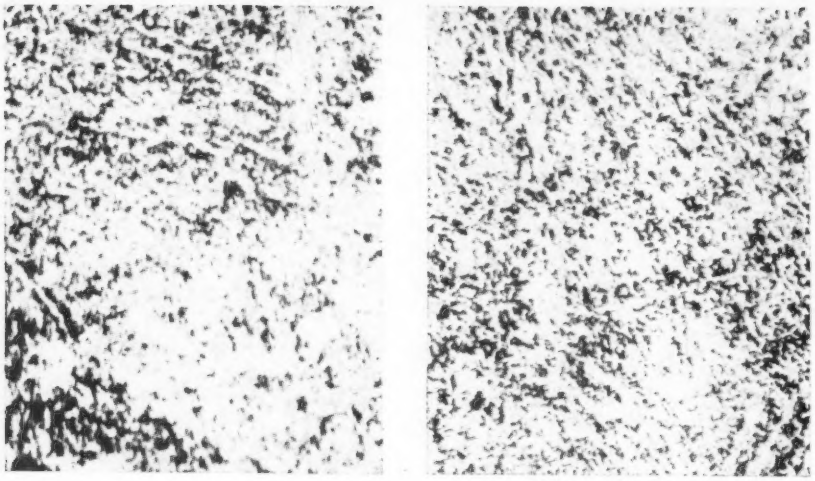


FIG. 32 (Left)—Bainite. Postheat 3 min. 808/860 deg. F., VHN 313-324. Improvement in sensitivity index + 0.414. (Right) Bainite. Postheat 24 hr. at 820 deg. F., VHN 289-292. Improvement in sensitivity index + 0.402.

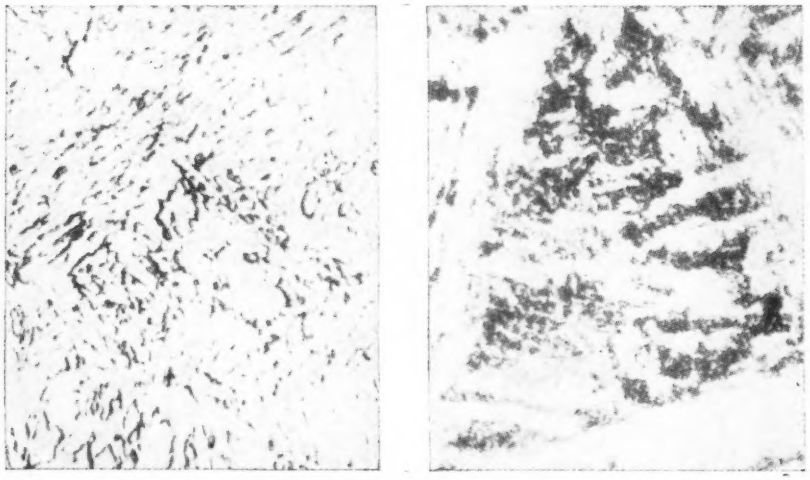


FIG. 33 (Left)—Incipient moly structure with some martensite. Postheat 3 min. at 1000/1040 deg. F., VHN 338-351. Improvement in sensitivity index + 0.364. (Right) Massive moly structure. Postheat 24 hr. at 1000 deg. F., VHN 271-274. Improvement in sensitivity index + 0.354.

examination of the structures reveals that the martensite in Fig. 29 is largely the alpha type, while structures in Figs. 30a and 31 are mostly the beta type. While the two types of structures are of similar hardness, only the alpha type is prone to cracking.

The remaining structures are all relatively soft and essentially free from cracking with the exception of Fig. 33. This latter structure, an incipient moly-structure, forms rather slowly and may be found mixed with martensite when a high temperature postheat is used for a limited time, the martensite accounting for the hardness.

While the jig temperature only exceeded the postheat temperature by approximately 30 deg. F. and returned to the nominal value in a period of 1 to 3 min., there was obviously a marked difference between the jig temperature and the actual temperature of the heat-affected zone, especially during the short postheating cycles.

In order to determine the true temperature in the heat-affected zone, fine thermocouples were peened into very narrow slots which extended into the affected zone and the temperature recorded by means of a high speed instrument. Duplicate tests were run at all the jig temperatures used in the postheating study, the cooling curves being recorded until the specimen returned to the jig temperature. A general idea of the amount by which the average heat-affected zone exceeded the original jig temperature may be obtained from the condensed Table XX. The true or average effective temperature subsequently mentioned in this report will be the jig preheat temperature with the addition of a correction factor, such as illustrated in the above mentioned table.

TABLE XX

True Average Hard-Zone Temperatures in Excess of Jig Temperatures

Postheat Time	Jig Preheat Temperature		
	100 Deg. F.	500 Deg. F.	1000 Deg. F.
1 Sec.	+853	+933	+650
5 Sec.	+740	+755	+508
10 Sec.	+654	+644	+437
20 Sec.	+533	+508	+317
60 Sec.	+311	+281	+164

Correlation of Hardness Data

In order to obtain a clear conception of the mechanism by which postheating alters the hardness and cracking characteristics of the heat-affected zone, the hardness and crack-index data are plotted in Figs. 34 and 35 against the average effective temperature.

From Fig. 34 (compare with Fig. 27) it will be observed that the region of maximum softness corresponds to the range in the S-curve where the transformation to bainite takes place most rapidly. (See S-curve in Fig. 36). The failure of the steel to soften in the first 10 sec. might not be predicted from the S-curve, but the hardness is not appreciably affected by the limited transformation during this short interval. It will also be noted that the high hardness in the region of 900 to 1100 deg. F. with time intervals of less than 1 min. is in good agreement with the slow rate of transformation indicated by the S-curve for this region.

The crack-sensitivity data, with respect to the average effective temperature, are shown in Fig. 35. In this diagram, the region of greatest improvement coincides with the bainite range. However, the hardening effect of ferrite precipitation between 1200 and 1300 deg. F. in the time interval of 20 to 60 sec. is not indicated in the cracking diagram. It appears that the expected adverse effect of the greater hardness is somewhat offset by the presence of the ferritic areas.

The information obtained from this study shows that, in general, the change in properties resulting from postheating the heat-affected zone may be predicted from the S-curve, taking into consideration that such curves are constructed from data obtained under ideal conditions for transformation. For most practical purposes, it was found that the postheating conditions which yielded the most satis-

factory results corresponded to the conditions in the S-curve which were most favorable to the formation of bainite.

APPENDIX

Determination of an Index Of Crack Sensitivity

IN an art such as welding, it is not always possible exactly to duplicate procedures from day to day. It may therefore become impossibly difficult to evaluate the welding properties by the usual method of testing under exactly defined conditions. For example, the percentage of cracking shown by the control steel, 557, may be seen from the data already presented to vary from about 19 to about 45 per cent without depending on any known and controllable condition. It may, however, be observed that when two steels are tested together, the percentage failures of each fluctuate together and retain a definite relationship. It is therefore possible in principle to evaluate in terms of the crack-sensitivity of a standard steel, the same property of all other available similar steels. It will be shown that this evaluation may be made independent of the test conditions; provided that these conditions are constant within one pair of tests, and provided that they do not fall in a range where either material fails to crack, or where either cracks by the operation of a new process.

In order to assign an index which will remain independent of ordinary variations in the test condition, it is necessary to consider the relative behaviors of the two observed failure values of real materials. Suppose that two steels, C and T, are tested under conditions such that steel C shows 10 per cent cracking and steel T shows 30 per cent cracking. If the same pair is tested again under more drastic conditions, such that C shows 30 per cent cracking, it will be found that the increase of cracking in T is more than the 20 per cent increase of C. However, the new value will be less than 3 times the old. The exact value will thus be between 50 per cent and 90 per cent, probably about 60 per cent. There is no simple method of arithmetic which will determine this value, but a very close estimate may be made by the use of the Normal Probability Function or the Gauss Law.

This probability function takes into account the normal distribution of experimental test data, life tests, actuarial data, etc., and is subject to statistical analysis, the mathematical

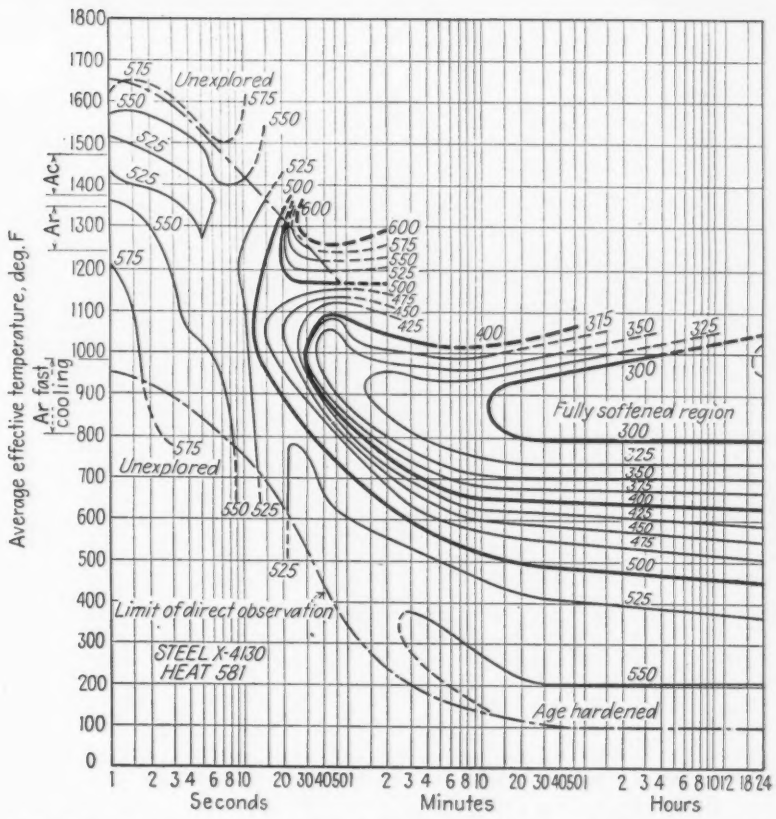
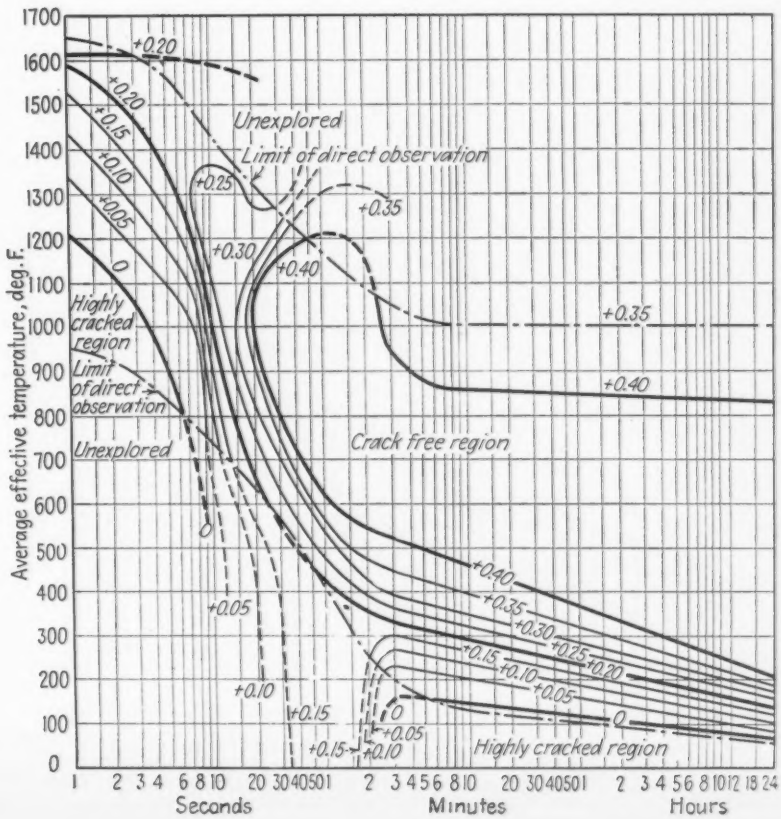


FIG. 34—Contours of equal Vickers hardness number vs. true temperature of weld zone in SAE 4130 steel.

o o o

BELOW

Fig. 35—Contours of equal improvement in apparent crack sensitivity.



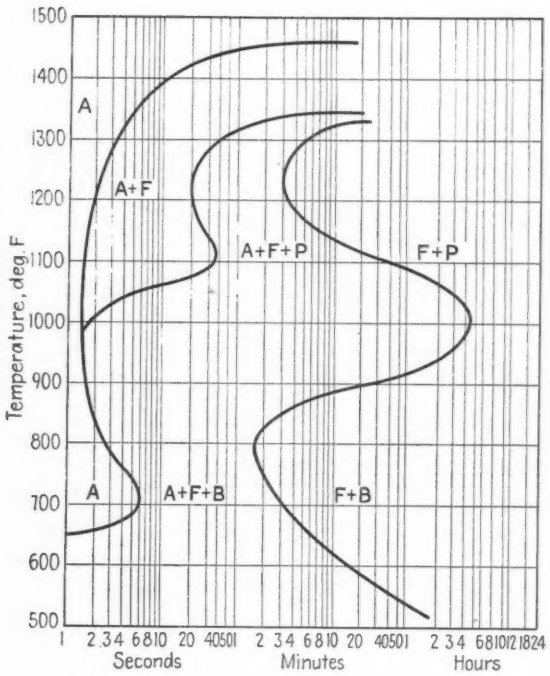


FIG. 36 — Typical S-curve for type SAE x 4130 steel austenitized at 1550 deg. F. Analysis: C 0.33 per cent, Mn 0.53 and Mo 0.18 per cent.

derivation of which need not be entered into here. In the welding tests described, all tests below a certain level of severity resulted in no cracking but as the level was raised, a few cracks were found (3 per 1000 samples). As the level was raised further, increasing numbers cracked, until about half the samples failed, after which the rate at which new cracks were found decreased because of the small number of surviving pieces. Plotting the data, a typical distribution curve results. Distribution curves of other cast data assume identical shape but are displaced along the abscissa a distance t which is the parameter of the family of curves.

It is customary to designate the material taken as a control as having properties taken as unity. In these welding tests the index of crack-sensitivity is assigned the value of 1 at the peak of the distribution curve (t=o). The lowest condition of comparison of two materials will occur when they have non-overlapping distributions, that is, when a test level exists at which all the test pieces T will crack and at which none of the control pieces C will crack. The index at this condition is assigned the value of O. This is the test condition where statisticians have shown that less than 3 out of 1000 pieces will overlap in properties. When these conditions are exactly reversed, the index of sensitivity will assume the value of 2.

Two tables are given which enable calculation of the index for common cases to be made. Table XXI gives the values of the index for various pairs of failure values for control steel C and test steel T. Let us assume,

(CONTINUED ON PAGE 148)

TABLE XXII

Values of Apparent Sensitivity, a, for 0 to 100 Per Cent Failures

% Failure	0	1	2	3	4	5	6	7	8	9
0	+.500	+.388	+.342	+.313	+.292	+.274	+.259	+.246	+.236	+.223
10	+.214	+.204	+.196	+.188	+.180	+.173	+.166	+.159	+.153	+.146
20	+.140	+.134	+.129	+.123	+.118	+.112	+.107	+.102	+.097	+.092
30	+.086	+.083	+.078	+.073	+.069	+.064	+.060	+.055	+.051	+.047
40	+.042	+.038	+.034	+.029	+.025	+.021	+.017	+.013	+.008	+.004
50	0	−.004	−.008	−.013	−.017	−.021	−.025	−.029	−.034	−.038
60	−.042	−.047	−.051	−.055	−.060	−.064	−.069	−.073	−.078	−.083
70	−.086	−.092	−.097	−.102	−.107	−.112	−.118	−.123	−.129	−.134
80	−.140	−.146	−.153	−.159	−.166	−.173	−.180	−.188	−.196	−.204
90	−.214	−.223	−.236	−.246	−.259	−.274	−.292	−.313	−.342	−.388
100	−.500									

$$\text{Index} = 1 - a_C + a_T;\ a = \frac{-t}{6}$$

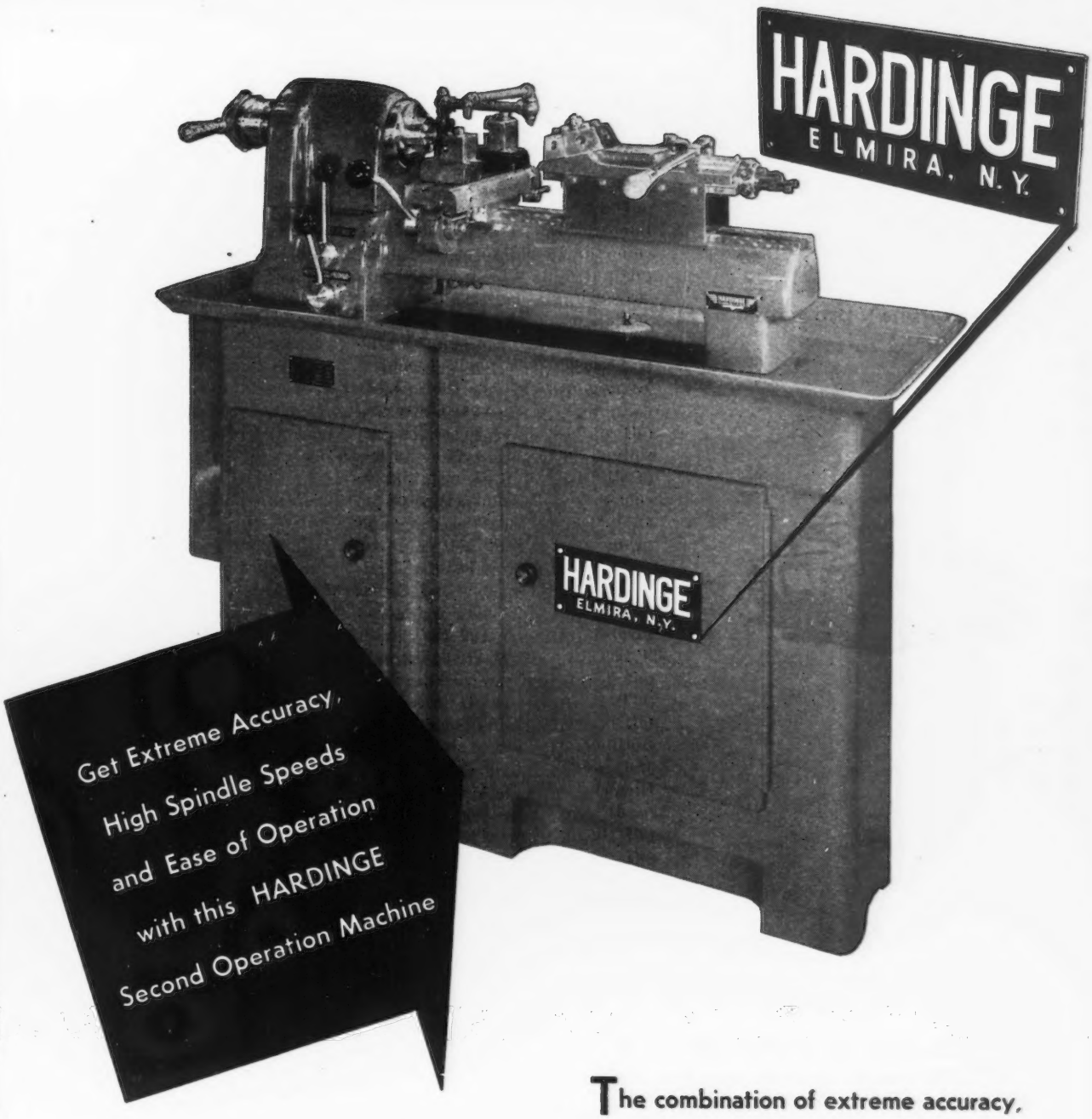
TABLE XXI

Index of Crack Sensitivity

	C	%	00	10	20	30	40	50	60	70	80	90	100
T	t_T →		−3.0	−1.28	−.84	−.52	−.25	0	.25	.52	.84	1.28	3.00
%	t_C ↓	a_C → / a_T ↓	.50	+.21	+.14	+.09	+.04	0	−.04	−.09	−.14	−.21	−.50
00	−3.0	+.50	1.0	1.29	1.36	1.41	1.46	1.50	1.54	1.59	1.64	1.71	2.0
10	−1.28	+.21	.71	1.0	1.07	1.13	1.17	1.21	1.26	1.30	1.35	1.43	1.71
20	−.84	+.14	.64	.93	1.0	1.05	1.10	1.14	1.18	1.23	1.26	1.35	1.64
30	−.52	+.09	.59	.87	.95	1.0	1.05	1.09	1.13	1.17	1.23	1.30	1.59
40	−.25	+.04	.54	.83	.90	.96	1.0	1.04	1.08	1.13	1.18	1.26	1.54
50	0	0	.50	.79	.86	.91	.96	1.0	1.04	1.09	1.14	1.21	1.50
60	.25	−.04	.46	.75	.82	.87	.92	.96	1.0	1.05	1.10	1.17	1.46
70	.52	−.09	.41	.70	.77	.83	.87	.91	.96	1.0	1.05	1.13	1.41
80	.84	−.14	.36	.65	.72	.77	.82	.86	.90	.95	1.0	1.07	1.36
90	1.28	−.21	.29	.57	.65	.70	.75	.79	.83	.87	.93	1.0	1.29
100	3.0	−.50	0	.29	.36	.41	.46	.50	.54	.59	.64	.71	1.0

$$\text{Index} = \frac{6 + t_C - t_T}{6} = 1 - a_C + a_T$$

where t = parameter for distribution curves of experimental data; and a = apparent crack sensitivity.



CAPACITY:
1/16" to 1" with collets
1" to 6" with step chucks
1" to 5" with jaw chucks
Spindle Speeds:
100 to 4000 r.p.m.

The combination of extreme accuracy, high spindle speeds and ease of operation means better results under the close tolerances of manufacturing standards both today and in the days to come. The ease and simplicity of operation enables relatively unskilled operators to produce parts to the necessary close limits without expensive tooling.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

Assembly Line . . . .

STANLEY H. BRAMS

• Uneasiness increases over labor outlook due to an abnormally large variety of interplaying factors . . . Politics and jurisdictional problems are coming to fore.

DETROIT—The labor pot has been on the back burner for a couple of months, but it is beginning to simmer and probably it will soon work its way up to the front of the stove.

The pot is filled with a variety of flavorings this time which outdoes even the most gaudy of the usual recipes of the CIO United Auto Workers Union. This *potage printemps* is blended with such factors as jockeying for political position within the union, worry over apparently diminishing influence in Washington, concern over reconversion shrinkage in union membership, jurisdictional feuding, the 30-hr. week, pensions for auto workers, the no-strike pledge, the Communist party line and its possible changes, veteran seniority, take home pay, impending job disaster for the aircraft plant membership section of the UAW, and other matters big and small. It is really one of the damnedest messes yet cooked up in the always-original Auto Workers Union.

Underlying much of today's maneuvering is the start of the long summer campaign for backing and ballots at next fall's UAW convention, if ODT decides to permit one. Out of politics grow most of the internal crises of the UAW, and out of these internal crises bloom the most melancholy of management's migraines. And so we have these situations arising.

The no-strike pledge is again a live issue within the UAW, with Walter Reuther resuming his right wing fight to eliminate it for civilian goods plants and apply it only to plants working on Japanese war materiel. Most significant in this scrap is the position which will be taken by the strong Communist elements within the UAW. During the war these "radicals" were far more conservative than Reuther's conservative bloc; they stood for outright maintenance of the pledge, without exception. With Russia out of the war today, however, they may change their position and become leftists in fact once more as well as in name. A move like that, coupled with Reuther's modification position, ineffective to date, would end for once and all even the partial effectiveness of the no-strike pledge, not only in the auto plants but in most other industries. Its applicability even to the remaining war plants would be flimsy indeed, because it would be a matter of practical impossibility to draw lines on one side of which strikes are permissible, on the other illegal. In a few quarters, Reuther's raking up of the no-strike pledge at this time is seen as a possible first move in a drive for the UAW presidency.

ALSO growing out of such political jockeying are items like a pension plan proposal for all automotive workers, being trial ballooned at present at Ford. As yet the outlines of the program are rudimentary: Retirement would be somewhere around 55 or 60 years of age, and pay would be at 75 per cent of the level normally earned in a year. It comes as no surprise that the company would be asked to make contributions to get the plan started. The possible 55-year retirement age, not as advanced as in most pension plans, would be a means of reducing the total labor supply and providing jobs for younger men. This plan, like many others of the auto union's, is definitely an objective, but owes at least a fair share of its conception to the desire of a union group—in this case Richard Leonard's, allied to a vague degree of strength with Walter Reuther's—to win rank-and-file membership support. This same political jockeying is the source of proposals that car makers sell their vehicles wholesale, that pay rates be raised to compensate for lost overtime, that the government, Henry Kaiser, or somebody else with a deep pocketbook keep Willow Run and other aircraft plants in production.

So much for the "politicking." That part of the pot's flavoring will become more dominant week by week for the rest of the summer. Consider next issue No. 2, rapidly arising to giant size—the possibility of outright collision between the UAW and the AFL Building Trades Council over jurisdictional rights in reconversion construction and plant revamping. This situation has been intensifying since it first began to appear several weeks ago (THE IRON AGE, May 10, 1945, p. 90).

PREVIOUS jurisdictional rights between CIO maintenance men in plants and AFL craftsmen employed by the plants or outside contractors have differed in each operation. The general pattern has been that the plants did what maintenance work they could with their own CIO help. Overflow work was assigned to AFL contractors, or AFL men were hired by the company on a temporary basis. On new construction work, AFL tradesmen built the building and brought in machines, sometimes temporarily installing them; CIO maintenance men finished the job.

In the course of time the CIO proportion of such work has increased.

Concentrated Production

Concentrated production will be the rule for both Chevrolet and Ford during the initial few months of production.

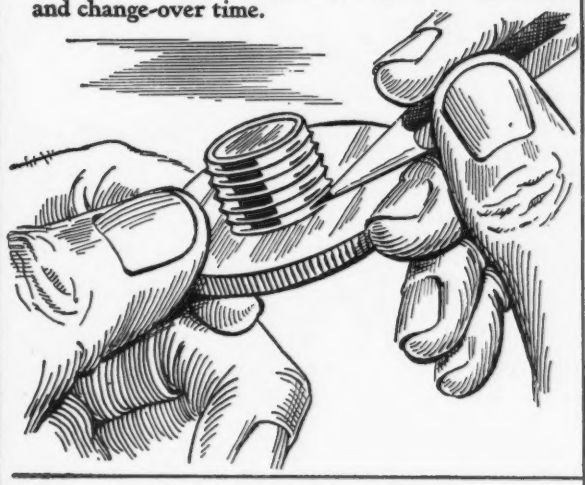
Ford will use only its lines at River Rouge, Edgewater, N. J., Louisville and Dallas. Present plans call for ultimate use of 15 assembly branches.

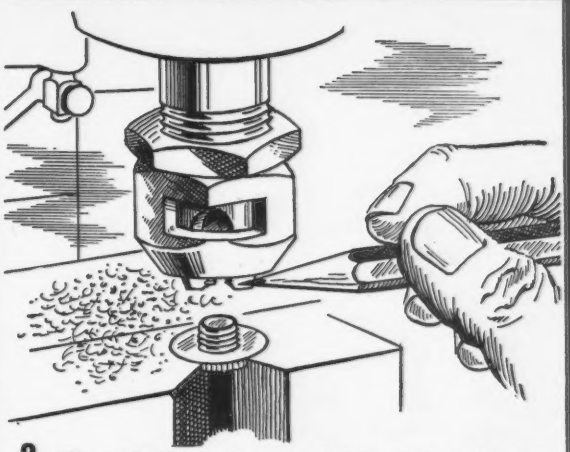
Chevrolet's main operation at Flint will not produce passenger cars at the start of 1946 model output. Final assembly work there will be delayed until the new big plant scheduled for early construction on the outskirts of the city is completed, perhaps, late this year. In the meantime, output will be limited to the plants at Janesville, Kansas City, Louisville and Atlanta, the latter a location which is being enlarged at cost of about $1,000,000.

THREADING SMALL PART WAS HEADACHE . . . UNTIL "GREENFIELD MAN" SHOWED HOW WITH "ACORN" DIE

[A GTD SHOW-HOW REPORT]

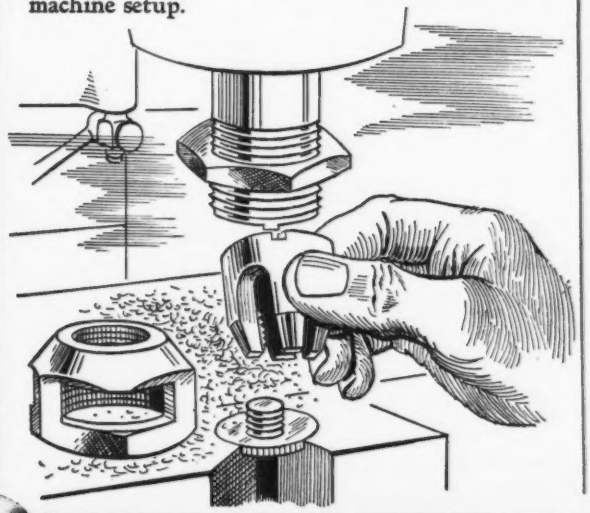
1 They were cutting an external thread on a zinc die casting. The thread length was only half an inch but it had to go to the bottom of the flange. The method in use would not deliver at high speeds, could not be adjusted quickly, required long setup and change-over time.

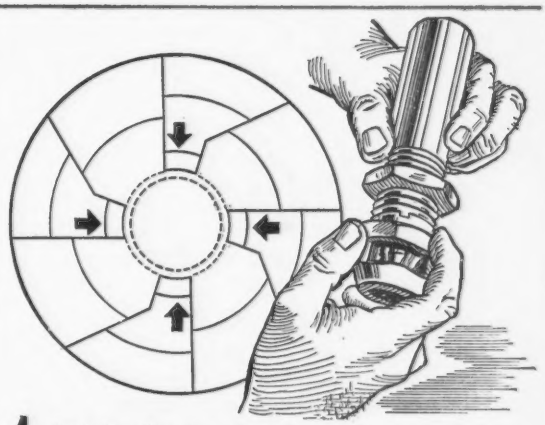




2 "Greenfield Man" was called in, suggested using an "Acorn" Die setup. Pointed out that "Acorn" Die allows threading as close to shoulder as desired since lands project out past the holder, (chamfered threads can easily be ground down by the operator or can be supplied already ground down).

3 He SHOWED HOW, by simply unscrewing the cap, the "Acorn" Die could be easily taken out of the holder for resharpening without disturbing the machine setup.





4 And finally, he pointed out how screwing on the cap compresses all four die lands to give a concentric adjustment. Accuracy of final adjustment is assured by the ground taper on the inner face of the adjusting cap which affords a perfect seat for the die lands.

Results! The customer's own words: "The job was very troublesome . . . but thanks to the 'Greenfield Man' the trouble was over when we used an 'Acorn' Die. The R. P. M. of the Die is 1100 on and 2200 off. Production has been stepped up to 1200 pieces an hour."

Greenfield's SHOW-HOW is KNOW-HOW in action!

ON THREADING PROBLEMS SIMPLY CALL YOUR "GREENFIELD MAN" THROUGH YOUR "GREENFIELD" DISTRIBUTOR!

GREENFIELD TAP and DIE CORPORATION
GREENFIELD - MASSACHUSETTS

CHEVROLET APPOINTEES: *John G. Wood, left, has been named chief engineer of the Chevrolet Motor Division, succeeding J. M. Crawford, named assistant to the G.M. vice-president in charge of engineering. Wood had been assistant chief engineer of Chevrolet for 12 years. His assistant will be Edward H. Kelley, right, former chief engineer of the Chevrolet aviation division.*

Today the AFL is at a point where it cannot identify the intrusion, but is satisfied of its existence. Hence its new position that whenever its members are started on a job, they will carry it to completion and must do all portions of it. They back up this position by the avowed intention of calling out every AFL man on every project of a company which does not follow their dictate, not only in Detroit but over the country at large. Conceivably this might be extended to dealerships—a matter of real embarrassment to the company. On the other side of the argument, CIO people are adamant in their intention of keeping all inside work for themselves and adding as much interplant transfer work as they can handle. It is notable that a small number of contractors in Detroit are now CIO-organized.

On the same score of jurisdictional situations, let it be recorded that the International Association of Machinists of the AFL is starting to reactivate itself in Detroit after a war period of moribundity; its efforts to organize tool and die shops may bring it into early conflict with UAW.

The veteran seniority problem is as thorny as ever (THE IRON AGE, May 10, 1945, p. 90), and certainly should be listed as another dominant problem. The others are comparatively less important but they exist, nevertheless, lending their respective tastes to the labor stew. Over the entire situation hovers the job uncertainty of reconversion during the coming few months; it is quite evident that the UAW is uneasy about it; and this atmosphere is flavoring the pot today along with the ingredients in it.

ANOTHER 1946 ENTRY: *Nash unveiled the pilot model of its* 1946 "600" *series last weekend—a new lower-priced car distinguished by lowered hood, streamlined fenders, more massive fender and grillework. Production will be under way on the job within the next two or three months. The Kelvinator Division of Nash-Kelvinator, meanwhile, obtained approval from WPB to spend* $761,600 *to renovate its Detroit and Grand Rapids plants for household appliance production.*

Charles Hardy Dies

New York

• • • **Charles Hardy,** president of Charles Hardy, Inc., metals and chemicals, and the Hardy Metallurgical Co., died recently here after a brief illness.

Born in Wandsbeck, Germany, Feb. 13, 1880, son of Martin J. and Johanna Hardy, Mr. Hardy attended American, German and English universities. He engaged in the metal business in London before coming to this country 30 years ago and entering the metal and chemical business here.

Mr. Hardy was a pioneer in the powder metallurgy field and held many patents on powder metallurgy and alkali metals. He was the author of many papers on powder metallurgy, akali metals, manganese, chromium and tungsten.

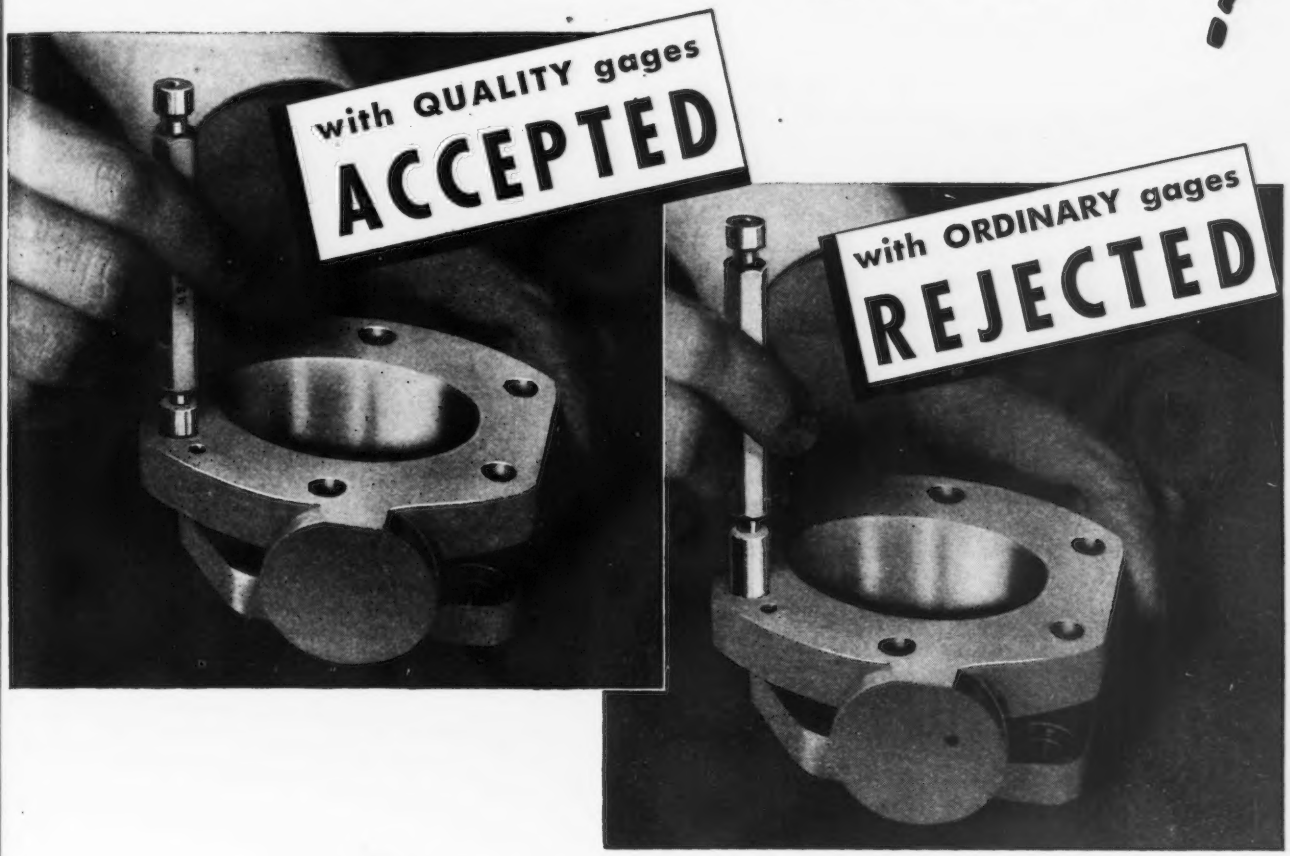
Skove Killed in Action

Cleveland

• • • **Thomas M. Skove,** general superintendent and a director of the Cleveland Twist Drill Co., who had been overseas a month on a special assignment for the U. S. Strategic Bombing Survey, was killed in action May 4, in Germany. For the past year Mr. Skove served as vice-president of the Cleveland Engineering Society, and was elected president of the society after his departure for Europe.

IT'S IMPORTANT TO YOU

to consider THIS *Cost Factor!*



Frequently, gage quality alone marks the difference between rejection or acceptance of satisfactory parts . . . between production profit or loss.

In the part illustrated, the holes may be extremely close to, but within, required limits. Using an ordinary new gage, in which usual allowance for wear has been incorporated, the "go" member may indicate the hole to be undersize. In a high quality gage . . . made of wear-resistant material . . . wear allowance is eliminated in its manufacture. It is *accurate* from the *first* inspection . . . and throughout its long, dependable service life. If the hole is actually within specified tolerances, it will be gaged correctly and the results of expensive man-hours and machine time will not be consigned to scrap.

This same initial accuracy in a gage . . . this same accuracy which is retained throughout the life of the gage . . . also provides quality control which consistently permits higher standards of precision in production departments. So, from every standpoint, good business judgment dictates the use of only the *best* gages obtainable. Lincoln Park produces them.

ARMY E NAVY

LINCOLN PARK INDUSTRIES, INC.

Successor to The Lincoln Park Tool and Gage Company and Carbur, Inc.

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Washington . . .

L. W. MOFFETT

• Concern shown on cutback publicity . . . Captured German facilities help prepare for Pacific push.

WASHINGTON—With the acceleration of contract terminations and cutbacks since VE-Day, Washington thinking has been focused to a greater extent on the need of distributing cutback information to labor, management and the general public so as to provide interested sources a factual, accurate account and to minimize speculation.

Unfounded rumors are particularly harmful because they may lead to production slow-downs, prove damaging to morale and cause widespread "cutback jitters" among uninformed workers. Personal knowledge of what the cutback means is a valuable aid to the worker in making plans for the future. If on the date the first layoffs will occur, the prospects of local or nearby job opportunities and the possibility of the plant continuing on other war work or converting to civilian production are made known, the situation is more likely to be a happier one for all concerned.

As the requirements of the war machine change, procurement agencies determine which production programs are to be reduced and refer their findings to an inter-agency group known as the Production Readjustment Committee. The PRC is made up of representatives of the Army, Navy, WPB, WMC, AFA, Smaller War Plants Corp., and Maritime Commission. Its functions are (1) to obtain factual information concerning cutbacks, (2) to decide on the distribution of cutbacks among producers involved and (3) to provide management, workers and the general public with timely information concerning such cutbacks.

While screening the proposed distribution submitted by the Procurement Agencies, PRC members study these proposals in the light of their particular interests; that is, considerations of the manpower situation, economic factors, continuing war production needs and possible reconversion plans.

Established procedure calls for determination by PRC within 24 hr. after receipt of proposals from the Procurement Agency. Where a substantial number of workers may be laid off as a result of a cutback, the local contract termination committee comes into the picture. There is one such committee in each principal industrial area and it consists of government representatives interested in the cutbacks from the standpoint of the impact upon labor, facilities and resources at the local level. Where special arrangements for notification of workers are necessary, the Termination Committee having been notified by Washington meets with the plant management who has already been informed by the Procurement Agency and, together with employee representatives, decide on necessary adjustments in plant shifts, working hours, application of seniority rules and employment opportunities elsewhere.

It is at this meeting that the committee supplies information which will make up the statement to be issued to the workers in the plant affected by the cutbacks. This will include (1) the scope of the cutback, (2) indication as to when it takes effect, (3) the number of workers to be laid off, (4) in-plant job opportunities where new contracts may be secured and (5) job opportunities elsewhere in the locality. Where there is an interval of unemployment before a new contract is secured, workers may be afforded limited certificates of availability permitting them to take temporary jobs before returning to work on the new contract.

After notification of the management and workers, public announcement is made locally by the Procurement Agency after consultation with interested agencies so that local facts may be blended with those furnished by Washington.

Where a substantial cutback is likely to be of national interest, a statement to be used as a basis of the information release will usually be prepared in Washington by the interested procurement agency for use in the field. An example of this was the recent announcement of the cutback in airplane production affecting several plants throughout the country. These national releases are timed to permit earlier release of the information locally.

The foregoing applies to cutbacks involving monthly production of more than $500,000. For smaller cutbacks not requiring prior approval by PRC, the matter is handled on a local basis with the plant management and workers being notified before the public release is made up. However, where substantial numbers of workers are laid off "large" cutback treatment may be utilized.

Closely connected with this situation are groups known as Joint Program Information Committees which have been established locally to develop cooperative information programs among government agencies. They are designed to (1) eliminate confusion on the part of management, labor, the Armed Services and other government agencies with respect to essential production requirements and manpower needs, (2) to assist in problems arising from future production curtailments and cancellations, (3) to effect local understanding of important production and manpower problems in their area, (4) to assist in placing skilled workers in undermanned plants and (5) to help reduce turnover, absenteeism and assist in cases requiring increased production.

* * *

Reports reaching the War Department from Europe indicate much preparation of equipment for shipment to the Pacific. All through France and parts of Germany this work is going on at an increased pace. The heaviest load falls on Ordnance troops, for their equipment, tanks, trucks, guns, ammunition, etc., require the utmost care in packing as well as a great deal of shipping space.

Much of this work is being carried out in former German installations. For example, the largest Ordnance depot in Europe was a German automotive supply base during the occupa-

BAR-STOCK TO FINISHED PART

18-8 STAINLESS... 30% BETTER TOOL LIFE

SUNICUT...

Keeps Small Tools Working Longer, Produces Better Finish

An eastern manufacturer was turning out 18-8 stainless-steel eye-terminals for the Navy on a Simmons Micro-Speed No. 2 Turret Lathe . . . cut-off and shape, rough turn, form, spot drill, drill, ream, and circular-form turn.

The material was 1" round annealed bar-stock, cut at a speed of 130 s.f.p.m. and spindle speed of 500 r.p.m. All tools were high-speed steel, except the rough turn and form tools which were carbide-tipped.

Short tool life . . . and poor finish, which necessitated hand-filing, were a problem, until a Sun Cutting Oil Engineer was called in, studied the different operations, and recommended Sunicut. With this transparent, sulphurized cutting lubricant, tool life has increased 25% to 30%; finish is now excellent; the hand-filing has been eliminated. Reamers now last 600 hours; forming tools average 280 hours.

If you're troubled by frequent set-up changes, poor finish, or other metal-cutting problems, talk with the Sun Cutting Oil Engineer near you, or write to . . .

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

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SUNOCO **SUN INDUSTRIAL PRODUCTS**

OILS FOR AMERICAN INDUSTRY

tion of France. This depot, consisting of scores of buildings rambling over hundreds of acres in the Bois de Vincennes, on the southeastern rim of Paris, has now turned its sights toward the Pacific. Before the German surrender this depot supplied the First, Third, Seventh and Ninth United States armies and the Ninth United States Air Force with Ordnance equipment. In addition, it was equipped with maintenance and repair facilities for automotive equipment, artillery and small arms and precision instruments.

The depot has already begun the deployment of weapons and vehicles for action against Japan. In its vast storage areas, one of them the huge enclosure of the Vincennes race track, are giant stockpiles of rehabilitated trucks, weapons and tires which are rapidly being funneled to ships leaving for the Pacific front.

Handling the job today, and the jobs that came before, are some 30 companies, half of which are maintenance units and the remainder supply units. Their personnel consists of some 3000 ordnance technicians, assisted by 2500 prisoners and nearly 4000 French civilians.

In a plant where the Germans assembled large U-boat sections, combat vehicles and weapons are being reconditioned for use against the Japs. Because it had been used for a specific purpose, the building of sections for submarine hulls, it was at first considered impractical for use by an Ordnance automotive company. However, it was later decided that the advantages far outweighed the disadvantages. On the credit side there was a modern $3,000,000 plant only slightly torn by saboteurs and bomb hits, $3,000,000 worth of usable machinery and important overhead cranes for moving heavy vehicles and materials. In fact, the Germans left so much behind that the unit began its operation with much of the American equipment in the original shipping crates.

On the debit side were tons of debris and rubble, tons of strewn steel and floor-covering assembly platforms supported by hundreds of 6-in. I beams three feet high. Cutting down these beams was one of the first necessary jobs. They were placed four feet apart, eight across each of the three assembly bays 150 yd. long. Tons of these beams were turned over to the Corps of Engineers for bridge building, but hundreds of tons still remained for further requisitioning. Other valuable finds included precision lathes, drill and punch presses, planers, tons of sheet metal and angle irons and critical acetylene welding rods.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

Bridge-Laying Tanks Revealed by British As Invasion Weapon

Washington

• • • **British tanks which** carry and lay their own bridges have been removed from the secret list by the British War Office and revealed as having played an important part in invading France and Germany and in the British advance in Burma.

The bridge-spans are so mounted that when tanks are held up by wide ditches or cratered roads, the bridge-laying tank can immediately lay across the obstacle a bridge which all other tanks and vehicles can cross —without a single man having to leave the bridge-tank or be exposed to enemy fire.

The bridge-tanks, of which there are several types, span ditches and craters up to 30 ft. wide or climb walls more than 10 ft. high. Their greatest advantage is that there is no delay in an advance while extra bridging material is called up.

In the assault on the Normandy beaches, these new tanks, some called ramp tanks, surmounted sea-front walls and various anti-tank walls. In subsequent operations they were used over craters, flooded streams and ditches. In some cases a combination of several tanks was used to span much wider gaps.

Designed by a team of Army officers, civilian scientists, and technical experts of the British Ministry of Supply, the various types include the "Scissors" bridge, a folding span carried on top of a Valentine tank. The bridge is laid by being automatically unfolded and lowered by a mechanism operated from inside the tank. Another, the Churchill bridge-layer, consists of a 30 ft. span of steel trackway, raised by an arm on the tank hull, carried forward and lowered across the gap in front of the tank.

Resigns from Steel Division

Washington

• • • **John F. Stapleton,** Chief, Distribution Branch, Steel Division, has resigned, WPB has announced. Mr. Stapleton who before coming to WPB in December 1942, was with the Carnegie-Illinois Steel Corp. will be associated with Industrial Metals Fabricators, Inc., Chicago.

Charles Halcomb, who succeeds Mr. Stapleton, has been with WPB for over four years and was formerly connected with the Procter & Gamble Co.

What's going to happen to the SUZY Q?

Remember the graveyard of rusting ships after the last war? For years a grim reminder of surplus war production, they also represented a practically bankrupt shipbuilding industry.

Today, America's aircraft industry accounts for a substantial proportion of our total national economy. That industry has produced more than a quarter of a million planes since Pearl Harbor! Its plants, equipment and production represent 50 billion dollars worth of taxpayers' money.

Here is the most valuable single peacetime legacy of war. . . . Here is power to maintain peace, insure our national security and provide jobs for millions of Americans . . . And here is a critical problem.

For the percentage of profit earned by our aircraft industry is so low that its entire capital reserves amount to only a few days' operating costs! The lack of a sound national airpower policy could actually result in the collapse of a great industry and the promise it holds for the whole world.

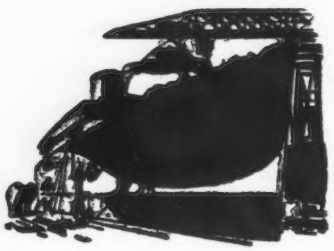
We at Bryant know that we can sell many machine tools to a healthy peacetime aircraft industry. But far more important — those tools mean jobs, and our last chance to enforce peace throughout the world.

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U.S.A.

West Coast. . . .

L. W. MOFFETT

• Western States Council Steel Committee demands Geneva and Fontana sale before shut-down, fixed price, private ownership, lower freight rates . . . Crisis mounts in ship repair program.



LOS ANGELES—Both Geneva and Fontana can operate at a production rate as high or higher than the average for the steel industry as a whole, the Steel Committee of the Western States Council believes.

The committee has compiled a comprehensive report, which also in effect answers the imposing list of questions on the subject recently posed by Senator O'Mahoney. It assumes postwar western steel consumption for seven states, Alaska, Hawaii and Pacific basin exports on the basis of the estimate of the U. S. Senate Committee on Postwar Economic Policy and Planning Committee at 4,685,000 tons against a potential production capacity of 4,613,000 tons.

Industry members flatly state that they are ready to make definite postwar plans and material requirement commitments, and stress the necessity for immediate action to avert a shutdown of either plant which would substantially lower their value to prospective purchasers.

The report declares that prewar Pacific Coast steel prices have been $10 to $15 per ton higher than in the eastern steel production centers for both eastern and western produced steel. This has had the effect of limiting fabricators' markets to definitely restricted areas. The report claims that under OPA regulations the Coast pays the nation's highest prices which are said to include "phantom freight" and other intangible charges. The committee insists that delivered prices of steel on the West Coast must be substantially reduced in advance of disposition of the two plants, and that the steel producing companies establish far western prices based on production cost, transportation from western mills, plus a fair rate of profit instead of on eastern prices plus real or arbitrary prices. They further point out that a basing point price at Geneva equivalent to that in effect at Sparrows Point would not result in lower delivered costs to Pacific Coast users because the $12 rail freight rate is almost identical to the intercoastal water rate. and therefore recommend a downward revision of the western freight rate, also in advance of the sale of the plants.

The committee, which represents the opinion of independent steel fabricators and processors in the eleven western states, declares that the two plants should be sold at a fixed price, operated under private ownership, that they should not be leased, that investments for conversion to peacetime production should not be made by the government and should not be made by lessees on government-owned property.

THE committee breaks away from the philosophy of "as expendable as a battleship" and believes that a pattern for the disposition of government-owned plants throughout the nation can be established by the settlement of the western steel situation. They state the approach should be "a united desire to serve the entire economy of a region." Not included in the steel committee report, but stated in answer to the O'Mahoney questionnaire to which the committee was signatory, were the additional assertions that members do not favor the granting of any special tax privilege to operators dependent on undeveloped markets or to operators of surplus facilities generally.

Recommending that the sale contract of the government-owned Geneva plant and the adjustment of the loan at Fontana should include statements of the price policy to be put into effect by the mill owners. The committee states that such policies should be based on production costs plus reasonable profit. In the O'Mahoney questionnaire members come out squarely with the statement that the mills should be sold at a fixed price. In the Steel Committee report proper, members state that they believe a fair value for the sale of the two properties in question can be arrived at by the following method:

(a) Estimate the fair value of the plant after necessary alterations and additions have been made to equip it for manufacture of the diversified products necessary to serve the western market properly.

(b) Deduct the cost of such alterations and additions.

(c) The remainder would represent the maximum amount which the Government should expect to realize from the sale of the plant.

The report adds that further consideration should then be given to the invested capital per ton of rated capacity which would then exist, as compared to the average for the steel industry. It is also emphatically stated that the adjustment of the Fontana loan "should bear such a relation to the disposal price of Geneva that neither plant will have an advantage over the other from the standpoint of capital cost to the private owner."

This committee seems to be leaning over backwards to avoid regional favoritism. Overall approach has been marked by calm acceptance of prevalent estimates for post-war consumption. Representing some 80 firms in all, the delegates on the coast-wise committee raise no question as to the West's ability to consume the output of the independent mills and additional break-even production from Fontana and Geneva. Their chief desire appears to be a sincere effort to avert a repetition of the Hog Island disaster. What little misunderstanding has cropped up is described as being "more a matter of terminology than of principle. Two fellows will start arguing and then find out that they are just using different words to talk about the same thing."

Basic premise for the report is that the two mills were erected at high cost for war purposes and that this portion of the cost may properly be written off, but that the $300 million total is an investment made primarily

to win the war and that it can make a permanent contribution to the economic welfare of the nation in terms of employment, production and costs.

SAN FRANCISCO—Agitation for equalization of wage rates for ship repair work between Navy and private yards gains momentum under the impetus of 359 ships in for repair in San Francisco Bay and 48 additional ships due to arrive.

With Navy yards paying $1.20 an hr. and private yards $1.34 for repair work, a serious shortage of skilled employees has developed in both government and privately owned yards. The exodus of workers from both types of yards belies the complaints of organized labor that civil service wage rates in Navy yards are responsible for the worker shortage. Pleas for increased pay in Navy yards overlook certain benefits which constitute a bonus over the $1.20 new work wage rate. Estimates of local union research departments state that these benefits—annual leave, sick leave, veteran's preference, benefits from the Retirement Act, disability benefits, U. S. Employees Compensation Commission benefits and medical advantages—constitute the equivalent of a rate of $1.28¾ an hour.

Shortage of skilled ship repair workers is described by the Navy as "the No. 1 Emergency of the Pacific War." Repair yards, both government and private, are operating on a ten-hour shift basis (with the exception of Mare Island, which recently went on three shifts). Unions and workers have expressed their willingness to go to a 12-hr. shift basis, and in the early days of the war 16 hours were sometimes common during busy periods.

Curiously enough, while a concerted hullabaloo is being raised to obtain the repair differential for Navy yards, in southern California—only 400 miles away—the repair rate has never been paid. Los Angeles and San Diego yards have continued to pay the $1.20 wage.

Unions and shipbuilders agreed in a series of conferences dating back to 1941 on the terms of what constituted repair work. The terms of this master contract were never put into effect in southern California where builders continued to pay the new rate for repair work. Requiring a more highly skilled worker, the result has been to deter the dirtier and harder repair work from going to southern California. Bay Area unions showed no great disinclination to benefit from the greater employment in their area, and little pressure has been exerted for regional equalization.

At a recent all-craft union meeting at Eureka the shipbuilding unions petitioned the government to investigate the government's and the private yard's failure to pay the repair rate in the south, and thereby relieve the traffic jam in San Francisco Bay. Unions also point out that Navy practice assigns one leaderman to 220 men. Private yards in repair work have obtained their best results with working leadermen often in charge of small units of men. This has had the effect of adding fifteen cents an hour frequently to the pay of top mechanics. Civil service employment, they contend, eliminates this "gravy." Meanwhile the WMC, starting June 11, is granting top priority and immediate referrals to skilled workers for ship repair in the hope of attracting good mechanics from uptown shops to the waterfront. Officials hope that the desperate condition can be met on a voluntary basis without having to resort to labor drafting.

Wilson Attacking Foremen's Drive

Pittsburgh

• • • **At the 15th** annual meeting of the Western Pennsylvania Industrial Conference last week, Charles E. Wilson, president of General Motors, said that unionization of foremen will cause inefficiency and result in a deterioration of America's mass production system. Such a movement would tamper with this country's "secret weapon of efficiency, originality and initiative." To be paid high wages, labor must be efficient and to be efficient, labor must be supervised and directed. Unionization would not be the solution to the problem, but would only add to it.

Mr. Wilson outlined to the delegates, numbering more than 1000, a seven point program from management that would result in a workable solution.

1. Each organization should clarify the job of each member.

2. See that foremen are properly compensated.

3. Handle carefully any change of status of any member of supervision.

4. Clarify status of foreman's authority against union standards.

5. Review labor and management problems and make sure they are not unkind to supervision.

6. Have training programs and refresher courses for members of supervision.

7. Establish personal leadership with the men throughout the organization.

Cited for Awards

• • • **The following companies** have received Army-Navy "E" awards for outstanding war production:

Army-Navy "E"

Argo Lamp Co., Philadelphia (second star)
Foster Wheeler Corp., Carteret, N. J. (fifth star)
Macwhyte Co., Kenosha, Wis. (third star)
Ready-Power Co., Detroit (first star)
United Transformer Corp., New York (first star)
Wheeling Corrugating Co., Wheeling, W. Va. (fourth star)
Dravo Corp., Neville Island Shipyard, Pittsburgh (fifth star)
Allen Mfg. Co., Nashville, Tenn.
Atlas Fence Co., Philadelphia.
Atlas Powder Co., White Haven, Pa.
Blackhawk Foundry & Machine Co., Davenport, Iowa.
Blumenstein & Co., New York.
Cherry Rivet Co., Los Angeles.
Dayton Rubber Mfg. Co., Dayton, Ohio.
Falls Spring & Wire Co., Attalla Mfg. Co., Attalla, Ala.
General Motors Corp., Fisher Body Divisions in Cleveland and Lansing, Mich.
Kelly Plating Co., Cleveland.
McDowell Mfg. Co., Millvale, Pa.
New Haven Clock Co., New Haven, Conn.
Plastic Wire & Cable Corp., Norwich, Conn.
Puritan Knitting Mills Co., Altoona, Pa.
J. L. Stuart Mfg. Co., San Francisco.
Vollrath Co., Sheboygan, Wis.

Engineering Firm Established

Los Angeles

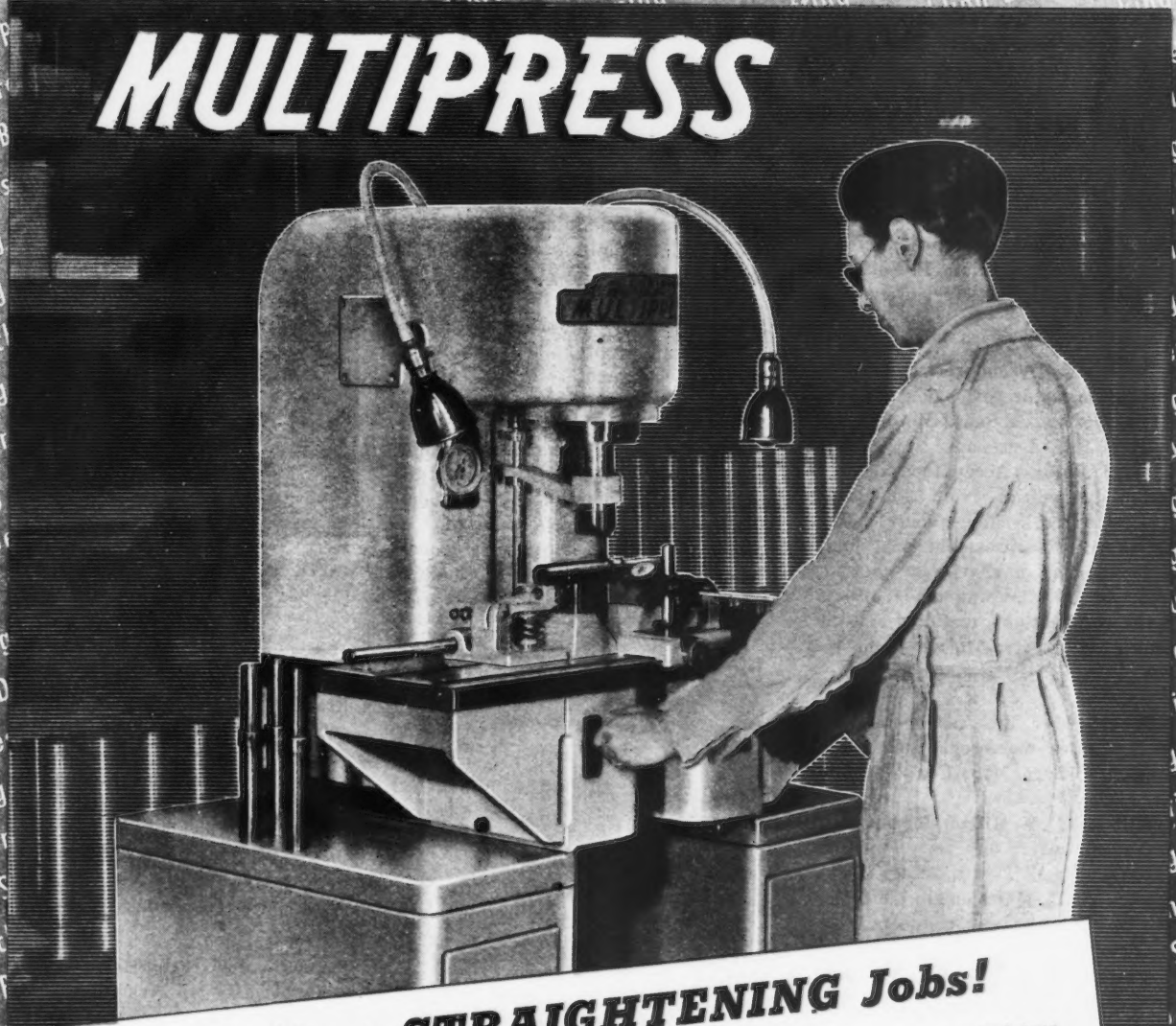
• • • **Omer L. Woodson,** formerly vice-president of Ryan Aeronautical has established an engineering consultants firm under his own name, with offices here, it was announced recently.

Services offered by the firm cover a full range of manufacturing, including plant layout, tooling, production planning and delivery of the finished product.

Associated with several aircraft manufacturers over many years, Mr. Woodson is now reported to be assisting Rheem Mfg. Co., and others.

Industry's New Tool of Multiple Uses

MULTIPRESS



—for Your STRAIGHTENING Jobs!

★ Industry's versatile newcomer—MULTIPRESS—equipped with its standard straightening fixtures, can handle any straightening task within its 4-ton pressure range with speed and precision.

Its ram responds instantly to the slightest movement of the control levers . . . may be brought down rapidly or slowly . . . can be stopped anywhere in its downward travel and the work positioned accurately beneath it. Full pressure may be applied at once or increased gradually. Ram pressure limits may be easily and quickly pre-set anywhere between 300 and 8,000 pounds. Ram travel may be limited anywhere between 1/16-inch and 6 inches.

Spring mounted gauging rolls, or gauging centers, disengage the work from the V-blocks for easy checking. The precision gauge on the straightening fixture checks shaft deflection, while the gauge in the throat of MULTIPRESS shows pressures exerted in both tons and pounds per square inch. Straightening tools screw into the internally threaded ram, and are available in radius, inverted radius, and flat styles. Adjustable lights—another MULTIPRESS accessory—afford light, without glare, on the exact work area.

Straightening is just one example of the amazingly wide range of production operations to which the basic MULTIPRESS (as shown below) can be quickly adapted. Other accessories include Motor-driven Indexing Tables, Automatic Cycling Action, Vibratory HydrOILic Pressure Ram Action, and others. Only 16 inches wide, 26 inches deep, and 34 inches high, the unit is a completely self-contained, motor-driven, oil-hydraulic machine tool . . . delivered ready to go to work after electrical connections have been made. Write for details!

The Denison Engineering Co., 1158 Dublin Rd., Columbus 16, Ohio

DENISON
EQUIPMENT in APPLIED
HydrOILics

PERSONALS

o o o

• **Basil M. Graham** has been elected president of the Central Iron & Steel Co., Harrisburg, Pa., succeeding the late Henry S. Evans. Mr. Graham, who has been vice-president of the corporation since 1941, has also become a member of the executive committee. **A. E. Eck**, previously general superintendent, has been elected vice-president, and **J. E. Jones**, secretary and treasurer. **William F. Zerbe** has been named general superintendent of the company.

• **Nelson C. Dezendorf** has been appointed director of sales, Electro-Motive Division, General Motors Corp., Detroit. Mr. Dezendorf served with General Motors Acceptance Corp. in various capacities from 1922 until 1941, when he became general assistant to the vice-president of General Motors Corp. in charge of distribution. In 1944 he was made director of the corporation's distribution staff, coming to Electro-Motive from this post.

• **Robert Wier, Jr.**, has been named general sales manager of the brush division, Osborn Mfg. Co., Cleveland.

• **William J. McMillen**, formerly assistant manager, has been appointed manager of roll sales, the MacKintosh-Hemphill Co., Pittsburgh. Mr. McMillen, who has been connected with the firm since 1916, was at one time in charge of the production department and later assistant to the plant manager. He entered the sales department in 1927, being named assistant manager of roll sales in 1940.

WILLIAM J. McMILLEN, manager of roll sales, Mackintosh-Hemphill Co.

• **F. A. Sherman**, formerly executive vice-president, Dominion Foundries & Steel, Ltd., Hamilton, Canada, has been elected president of the company. **C. W. Sherman**, who organized the company 33 years ago and been president since its inception, has been elected board chairman.

• **Maurice J. Day** has been named manager of the alloy bureau, Chicago metallurgical division, Carnegie-Illinois Steel Corp., Pittsburgh. **Albert L. Kaye**, who has been head of the bureau for the past four years, becomes metallurgical engineer, alloy steel products, Pittsburgh.

LONNIS DENISON, vice-president and general manager, Denison Engineering Co.

• **Lonnis Denison**, formerly assistant general manager, Denison Engineering Co., Columbus, has been appointed vice-president and general manager, and **Frank C. Norris**, formerly director of production, has been made vice-president in charge of manufacturing and engineering.

• **R. S. McLaughlin** has been appointed chairman of the board for General Motors of Canada, Ltd., where he has been president for the past 26 years. **William A. Wecker**, formerly vice-president and general manager, has become president and general manager.

FRANK M. ALDRIDGE, general sales manager, Ohio Tool Co.

• **Frank M. Aldridge** has been named general sales manager of the Ohio Tool Co., Cleveland, and will direct all the company's national and export sales efforts. Previous to joining the company, Mr. Aldridge was associated with the WPB as deputy regional director of Ohio, West Virginia, Kentucky and western Pennsylvania.

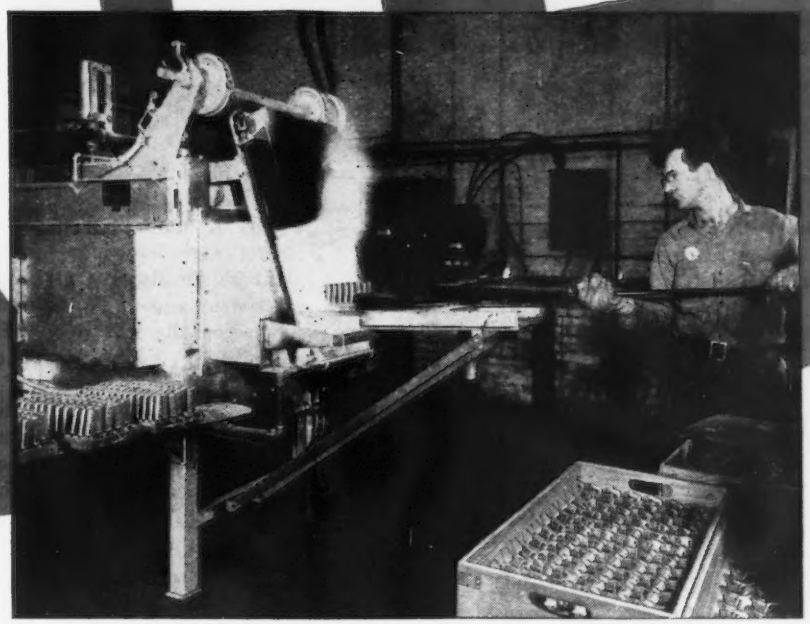
• **Kenneth MacGrath**, executive vice-president, has been elected president of Air Associates, Inc., Teterboro, N. J., effective August 1, succeeding **Harold I. Crow**, resigned. Mr. MacGrath as executive vice-president immediately assumes complete responsibility for directing all operations of the company.

• **H. L. Boyle** has been elected vice-president in charge of purchasing, Deere & Co., Moline, Ill. Mr. Boyle came to the company from the WPB in Washington, where he served with the Farm Machinery and Equipment Division.

• **W. F. Boyle** has been appointed assistant to the vice-president to direct the Pacific Coast district office of the Baldwin Locomotive Works, Eddystone, Pa., and the Pelton Water Wheel Co., San Francisco, wholly-owned subsidiary. Mr. Boyle will temporarily assume the duties formerly performed by **F. R. Kohnstamm** at the San Francisco headquarters of Baldwin and Pelton, Mr. Kohnstamm having been temporarily relieved due to illness.

THIS LINDBERG BRAZING FURNACE GIVES YOU 6 in 1

Furnaces



You can use this new completely engineered furnace for:

1. High temperature copper brazing
2. Low temperature silver brazing
3. Sintering of powder metals
4. General tool hardening
5. High speed tool hardening
6. Bright annealing

Keep it as busy as you can with brazing, but if your brazing production is irregular this furnace offers ideal facilities for any other heat treating operation requiring a protective atmosphere. A mid-west manufacturer, for example, hardens the dies used for forming the parts to be brazed.

Globar elements develop a temperature up to 2500° F. At copper brazing temperatures of 2050° F., the Globar elements are not forced to their full heating capacity and the additional degrees up to 2500° F. allow plenty of range in which to heat any of the high speed tool steels for hardening and also for sintering certain powder metals. These non-metallic elements are easily replaced in a few minutes without cooling down the furnace, virtually eliminating production delays. A choice of protective atmospheres allows treatment of any kind of steel.

Find out all about this versatile hand-pusher type furnace. Write now for bulletin 200. Lindberg Engineering Company, 2452 W. Hubbard Street, Chicago 12, Illinois.

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SUPER-CYCLONE • CYCLONE • HYDRYZING • BRAZING

ROBERT E. RUTZEN, foundry superintendent, Wilson Foundry & Machine Co.

ARMIN G. KESSLER, manager of sales, midwestern district, Farrel-Birmingham Co., Inc.

ROY I. MacARTHUR, superintendent, forge plant, Buick Motor Co.

• **Robert E. Rutzen** has been appointed foundry superintendent of the Wilson Foundry & Machine Co., Pontiac, Mich.

• **Adolph G. Schroeder,** formerly manager of the machinery and equipment department of the Iron & Steel Products, Inc., has become associated with Industrial Plants Corp., Chicago, in an executive capacity.

• **Albert R. Tucker** has been appointed to the newly created position of West Coast manager of the Electrochemicals Department, E. I. du Pont de Nemours & Co., Wilmington, Del. The El Monte plant and sales office at El Monte, Calif., and the district sales office at San Francisco, will be consolidated under Mr. Tucker, who has been Philadelphia district manager for the department since 1936. **Frederick C. Schumacher,** former assistant manager of the N. Y. district office, has succeeded Mr. Tucker as manager at Philadelphia.

• **Frederick W. Rohde,** known as the first American to attempt a transatlantic flight from Europe to America, has been appointed manager of quality control at Westinghouse Electric Corp.'s Aviation Gas Turbine Division at South Philadelphia, Pa.

• **R. S. Zirbel** has been appointed production manager for the Winslow Engineering Co., Oakland, Calif.

• **Armin G. Kessler** has been named manager of sales of the midwestern district, Farrel-Birmingham Co., Inc., Ansonia, Conn. Mr. Kessler first came to Farrel-Birmingham in 1920 as general manager of the plant in Buffalo, N. Y. He has been a vice-president and director of the firm since 1923, and prior to his present appointment was general works manager of the company's three plants in Ansonia and Derby, Conn., and Buffalo, N. Y.

• **Daniel A. Herrick** has been appointed manager of sales of d'Este Division, American Chain & Cable Co., Inc., Bridgeport, Conn., with headquarters at Reading, Pa.

• **Alvin Dice** has retired as vice-president in charge of production, Albion Malleable Iron Co., Albion, Mich., but will remain a member of the board of directors. Mr. Dice has been associated with the firm for 33 years. **George H. Bachman,** for the past five years in the production department, has been appointed production manager.

• **Stanley G. Disque** has been named district sales manager of the Superior Drawn Steel Co., Monaca, Pa.

• **D. P. Morgan** has joined the sales staff of the Pittsburgh Steel Foundry Corp., Glassport, Pa., as assistant sales manager of the Philadelphia district.

• **Roy I. MacArthur,** previously assistant superintendent of the forge plant Buick Motor Co., Flint, Mich., has been appointed superintendent, succeeding the late Robert H. Darnton. **Noel F. Young,** former assistant superintendent in charge of the die shop, succeeds Mr. MacArthur as assistant plant superintendent, and **Walter G. Malmquist** has become assistant superintendent in charge of the die shop.

• **George S. Garrard** has been appointed chief engineer of the Briggs Clarifier Co., Washington, D. C. Mr. Garrard was previously connected with Jacobs Aircraft Engine Co., Pottstown, Pa., where he was assistant chief engineer in charge of all engineering branches.

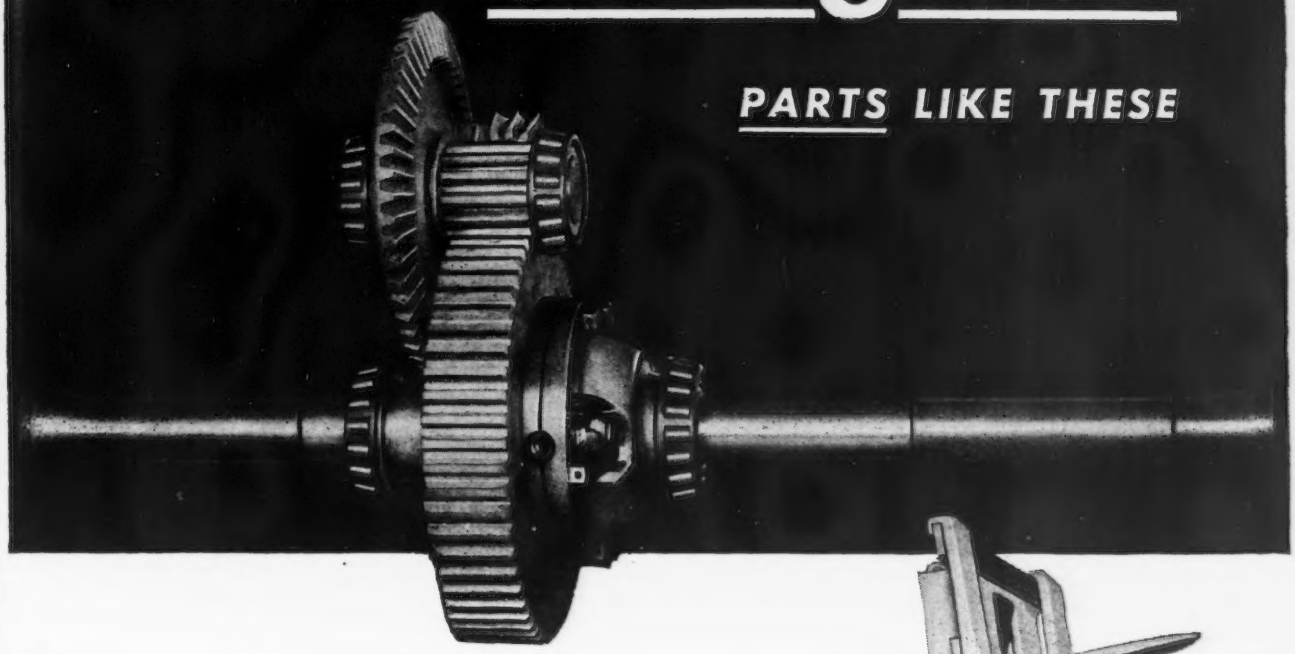
• **John T. Leslie,** field engineer for the Reynolds Metals Co., Chicago, has been appointed central aluminum division representative for Wisconsin and Minnesota with headquarters at Milwaukee.

OBITUARY...

• **Earl M. Bowman,** mechanical engineer for Republic Steel Corp., Cleveland, and nationally-known authority on open hearth steel operations, died May 28 at the age of 57.

• **Robert H. Darnton,** superintendent of the forge plant, Buick Motor Corp., Flint, Mich., died recently.

NICKEL ALLOY STEELS Strengthen PARTS LIKE THESE

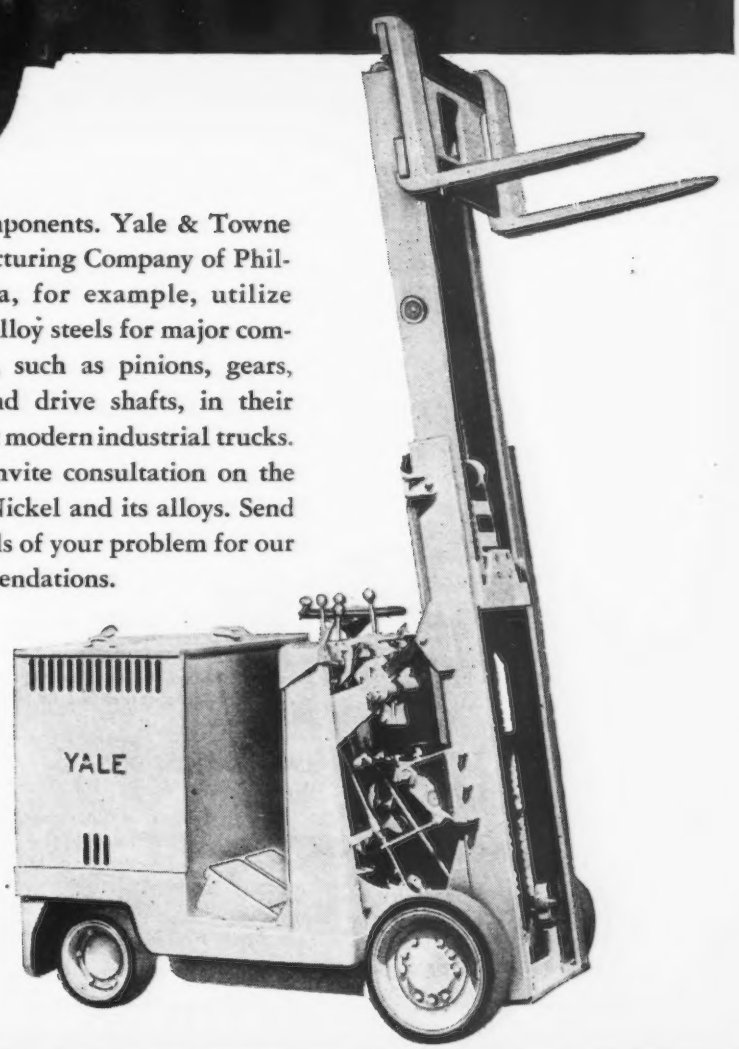


Strength of steel may be increased by additions of Nickel... without sacrificing ductility... but that's not the whole story.

Nickel additions improve toughness and promote depth hardening in heavy sections. In addition, Nickel intensifies the effect of other alloy elements.

Alloy steels fortified by Nickel have proved reliable for automotive components. Yale & Towne Manufacturing Company of Philadelphia, for example, utilize Nickel alloy steels for major components, such as pinions, gears, axles and drive shafts, in their compact modern industrial trucks.

We invite consultation on the use of Nickel and its alloys. Send us details of your problem for our recommendations.



● This modern high-lift Yale truck can deftly pick up and transport 10,000 lb. skidloads... and raise the full 5 tons through a standard range of 60 inches.

Edison Nickel-iron alkaline storage batteries provide a rugged, light-weight power source in many of these trucks. Nickel in the positive elements and Nickel plated steel parts throughout the battery contribute to its long dependable service.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

Dear Editor:

SPHEROID PARTICLE SIZE

Sir:

We would appreciate receiving a reprint of the article "Controlled Spheroidization of Pearlitic Malleable Iron" by C. R. Wiggins, which appeared in the May 10 issue.

RICHARD P. SEELIG,
Chief Engineer
Powder Metallurgy Corp.,
Long Island City 1, N. Y.

● Tear sheets mailed.—Ed.

LEAD COATINGS

Sir:

We read the article, "Lead Coated Steels Appraised," in the May 24 issue but found that it talked a language we did not understand. Thickness of coating is designated throughout by decimals of an inch, whereas we are accustomed to thinking of coating in terms of oz. per sq. ft. It has been our experience, both in Canada and on your side of the line, that this is the way coatings are usually spoken of. Note, for example, the Weirton Steel ad on page 19 of the same issue, where the coatings are designated 0.10 oz. per sq. ft., 0.20 oz. per sq. ft. No doubt we have some tables in the office that would enable us to convert the decimals to ounces, but life is too short.

May we add that what we are most interested in is lead coatings comparable with the weights of commercial zinc coatings, a range of 1.25 to 2.00 oz. per sq. ft., and if friends Battelle have any information on lead coatings of approximately these weights, we should like very much to have information regarding them.

G. G. COMPLIN,
Manager
Metallic Roofing Co., Ltd.,
2-28 Atlantic Ave., Toronto 1

● This article refers to electro coated lead and it is common practice in this country to specify thicknesses of electro-plated material in ten-thousandths or one hundred-thousandths of an inch rather than in weight per sq. ft. For sheet coated on both sides, the conversion to weight per unit area may be made on the basis of 0.001 in. of lead coating equals 1.9 oz. per sq. ft.—Ed.

BURRING TOOL

Sir:

Will you let us have further information on the power burring tool described in the May 17 issue on p. 58. Is this tool available commercially as yet, and if so will you refer us to the manufacturer? If not available commercially, is it possible for us to produce plans and specifications to make one ourselves?

BRUCE B. BLICKMAN
S. Blickman, Inc.,
Weehawken, N. J.

● This tool is not yet produced commercially. Consolidated Vultee Aircraft Corp. is seeking to license someone who would be willing to handle it on a royalty basis. For plans and specifications write G. T. Gerlach, patent director, Consolidated Vultee Aircraft Corp., San Diego 12, Cal.—Ed.

NELSON TREATMENT

Sir:

Do you know anything about a Nelson Process for treating steel, possibly controlled by a U. S. Engineering & Mfg. Co.?

D. W. KAUFMANN,
Metallurgist
Crucible Steel Co. of America,
Syracuse 1, N. Y.

● This is a method of improving the tensile strength of mild steel by quenching. The tensile strength is said to be increased by 10 to 12 per cent over water quenching. We do not know of the U. S. Engineering & Mfg. Co.—Ed.

PROTECTIVE COATING

Sir:

In THE IRON AGE for May 24 some data regarding Iridite, a corrosion protective coating, was published. We would appreciate your informing us of the name of the manufacturers.

E. L. McREYNOLDS,
Metallurgist
Union Drawn Steel Division,
Republic Steel Corp., Massillon, Ohio

● Rheem Research Products, Inc., 2523 Pennsylvania Ave., Baltimore, Md., a subsidiary of Rheem Mfg. Co., are the producers.—Ed.

GRINDING KEY COCKS

Sir:

We would appreciate it if you would advise us of the names of the principal manufacturers of machinery for grinding the taper on ground key cocks, such as the machinery manufactured by the Milwaukee Cock Grinding Co., Milwaukee.

L. C. SMITH, JR.
Roberts Brass Mfg. Co.,
Detroit, Mich.

● As far as we know there is no company now producing the special grinding machine for finishing the taper on ground key cocks. It is our belief that this work can be done on any standard universal grinder, for which a list of manufacturers has been mailed.—Ed.

LAMINATION DIES

Sir:

May we have a dozen reprints of the article, "Increasing the Life and Accuracy of Lamination Dies," from the May 3 issue?

J. D. GARVIN
Allegheny Ludlum Steel Corp.,
209 North Beaumont St., St. Louis 3

● Reprints have been prepared and will be mailed at a cost of 15c. per copy.—Ed.

PREHEATING FUEL OIL

Sir:

Could you give us information on the use of Bunker C fuel oil? We would like to know whether this must be heated in cars in transit, and in storage tanks. What type of burner is usually used and what method is adopted for ignition, in other words what type of gas is used to start the burner before turning in the heavy oil?

J. G. FRASER,
General Manager
Northern Bolt, Screw & Wire Co.,
Owen Sound, Ontario

● General practice is to heat such oil in transportation by using cars with coils built in for steam heating. However this varies according to climatic conditions and oil characteristics. Bunker C fuel oil can vary in pour point from 14 deg. F. to 100 deg. F. and its viscosity can vary from 45 sec. to 300 sec. Preheating is usually required in storage and the entire tank of oil may be heated, or an outlet heater may be used. Ignition may be manual or automatic with gas pilot or electrical ignition.—Ed.

RE-USING BABBITT

Sir:

Please tell us what to use to clean rerun babbitt so we can use it over again. We want to get out the dirt. We have used rosin but thought there might be something better.

RANGER MACHINE CO.
Ranger, Texas

● Rosin is a satisfactory material to use for the purpose, but zinc chloride or zinc ammonium chloride, sal ammoniac, ½ lb. to the potful may also be used. It is important to let the heated mix settle for 15 to 20 min. to permit the babbitt to separate from the flux. This procedure will generate fumes but they can be controlled. The melt should be sprinkled with sawdust which should be permitted to remain until burnt.—Ed.

MAGNESIUM TREATISE

Sir:

I would appreciate separate prints of "Magnesium Sand Castings" July 10, 1941; "Plastic Working of Magnesium Alloy Sheet" March 18, 1943, and "Magnesium Castings Impregnated by New Method," Nov. 11, 1943. I need the material for the book I am writing on magnesium. I would also like to contact the authors and have your permission to reprint figures and photos from the articles.

DR. F. J. HANSGIRG
Black Mountain College,
Black Mountain, N. C.

● We are sending tear sheets and authors' addresses.—Ed.

COLLOIDAL GRAPHITE

Sir:

In the pamphlet issued by the Committee on Military Affairs, several new wartime technological developments were indicated, including the process of Aquadag, described in THE IRON AGE, May 13, 1943. May we have descriptive matter pertaining to this development?

G. E. FIGLER,
Vice-President
Keystone Lamp Mfg. Corp.,
175 Fifth Ave., New York 10

● We are sending a tear sheet of the article "Punch and Die Life Increased by Colloidal Graphite Lubricant," referred to in your letter.—Ed.

IT'S NEW!

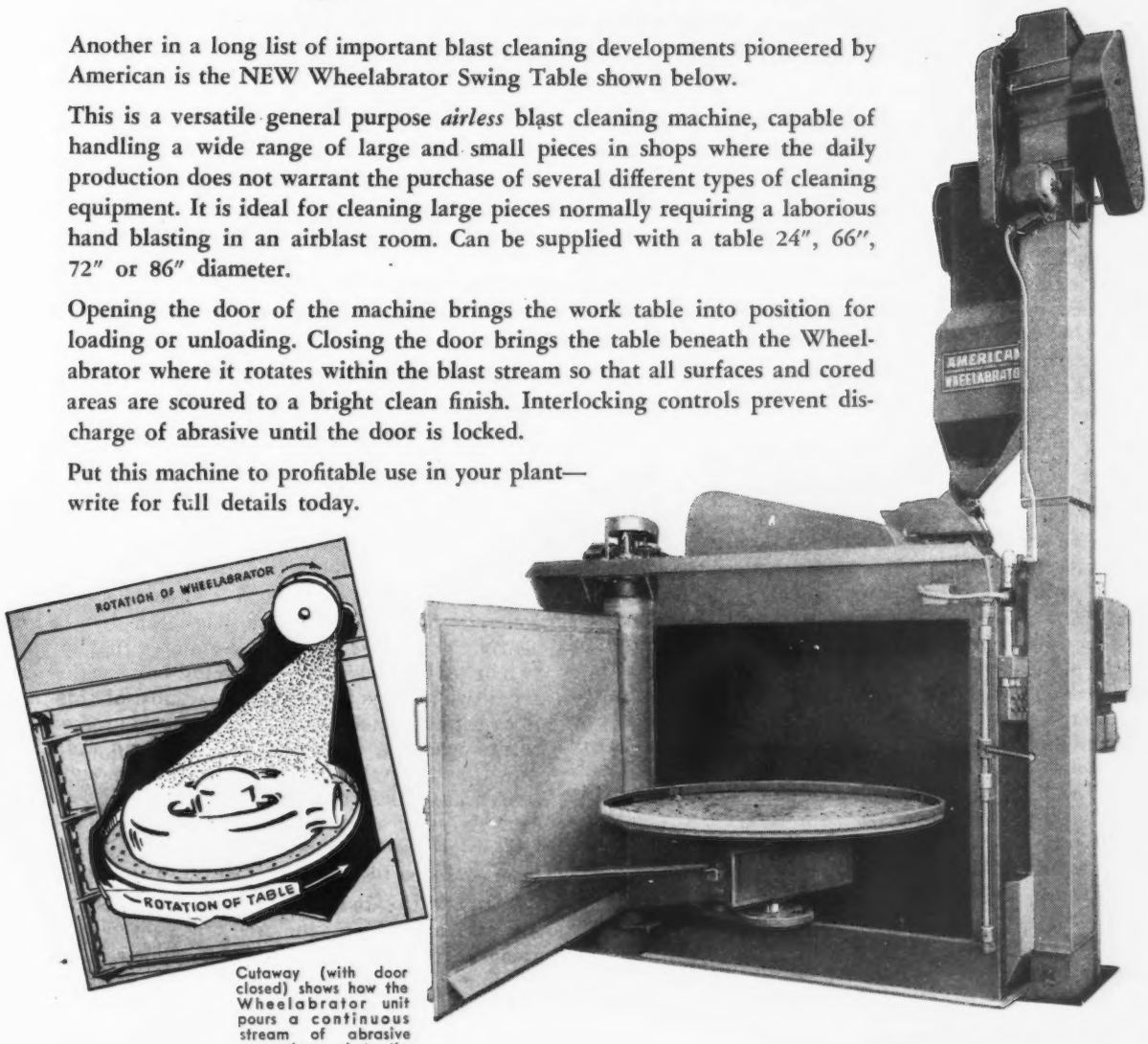
THE WHEELABRATOR Swing Table

Another in a long list of important blast cleaning developments pioneered by American is the NEW Wheelabrator Swing Table shown below.

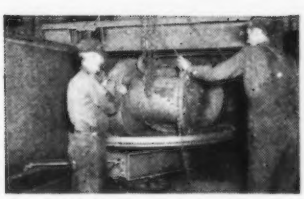
This is a versatile general purpose *airless* blast cleaning machine, capable of handling a wide range of large and small pieces in shops where the daily production does not warrant the purchase of several different types of cleaning equipment. It is ideal for cleaning large pieces normally requiring a laborious hand blasting in an airblast room. Can be supplied with a table 24", 66", 72" or 86" diameter.

Opening the door of the machine brings the work table into position for loading or unloading. Closing the door brings the table beneath the Wheelabrator where it rotates within the blast stream so that all surfaces and cored areas are scoured to a bright clean finish. Interlocking controls prevent discharge of abrasive until the door is locked.

Put this machine to profitable use in your plant—write for full details today.

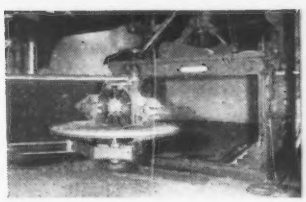


Cutaway (with door closed) shows how the Wheelabrator unit pours a continuous stream of abrasive upon the work to the full width of the table.



A 66" Wheelabrator Swing Table used by Ottumwa Iron Works, Ottumwa, Iowa, has cut cleaning costs 25 per cent and reduced cleaning time to 8 minutes per table load, in cleaning steam drum winches, electric hoist castings and miscellaneous gray iron castings.

The 86" Wheelabrator Swing Table at the Link Belt Ordnance Co., Chicago, cleans large parts for anti-aircraft and howitzer gun carriages in about one-fifth the time formerly required for hand blasting in a large airblast room.



American FOUNDRY EQUIPMENT CO. 510 S. BYRKIT, STREET MISHAWAKA, INDIANA

This Industrial Week . .

- ***Steel Market Trends Appear Contradictory***
- ***Cancellations No Help to Nonrated Orders***
- ***Army Freight Car Program Includes 57,045 Units***

WITH steel backlogs still heavy, rated order volume declining, steel ingot output at a reduced level from a few months ago and the failure of cancellations to produce an anticipated opening on steel mill schedules, the steel picture this week presented some apparent contradictions.

Despite trends in order volume as well as in cancellations, there was still this week no definite indication that nonrated steel orders for civilian production would find positions on steel mill schedules to any great extent in the third quarter. Nevertheless the slowness of cancellations in Army programs to be interpreted into tonnage released from steel mill books is giving rise to a strong feeling in the industry that by the fourth quarter of this year the case for the civilian steel user will be greatly enhanced.

There was some speculation in the trade this week that because of the tightly-packed mill schedules through the third quarter, the Controlled Materials Plan may not give way to a simplified priority system as originally anticipated. Inability of mills to schedule unrated business, except for one or two relatively unimportant items, in the third quarter appears more and more definite. Some sources believe that unless cancellations swell greatly in volume, production of automotive sheet tonnage required to meet manufacturing quotas will be problematical even in the fourth quarter. The present situation, however, is so amenable to change in market conditions that many problems now seemingly difficult may be ironed out.

The drop in the volume of rated steel orders this past week is in no small part due to WPB's reluctance to authorize advance allotments for the fourth quarter of this year and early 1946, the earliest for which deliveries are available for most products. This situation may be classed as hopeful for nonrated business. On the other hand if many of the present contract schedules are continued, it would mean a dammed-up demand for these advance periods which would be afforded some sort of a priority protection even if CMP is set aside.

FRESH net rated steel order volume last week dropped, with some exceptions, to about 20 per cent of the peak levels prevailing earlier this year. With the exception of one or two isolated periods the volume was one of the lightest of the war and in at least one case June business thus far is a negative figure with cancellations exceeding entries.

With most shell steel, alloy, structural and armor plate cancellations noted on the books and landing mat cutbacks underway, some sales officials see the end of the heavy period of cancellations in sight. Only about 25 per cent of the cancellations to date have affected May and June schedules, the balance affecting scheduled shipments throughout the rest of the year.

An example of the lag of steel mill cancellations behind contract cutbacks is indicated in landing mat requirements being dropped from schedules this week, although news of the program cutback came a month ago. Space on mill schedules thus opened, understood to be in the neighborhood of 150,000 tons, will be quickly filled by carryover tonnage. Such an example indicates why unrated steel orders get little comfort from such a cutback even though it is the largest sheet termination now in sight. The volume of rated sheet business now on the books and yet to be filled continues to be substantial.

NEW productive facilities for the automotive industry loom large in current structural inquiries with 6000 to 8000 tons for a Chevrolet assembly plant at Flint, Mich., 4000 tons for a Fisher Body plant at Columbus, Ohio, 6000 tons for a Ford Assembly plant at St. Louis, 8000 tons for a General Motors assembly plant at Wilmington, Del., 2500 tons for a GM plant at Janesville, Wis., and 250 tons for an extension to a Ford plant at Memphis.

Building activity has also affected the volume of concrete bar orders which has been increasing recently. One large producer estimates that in the past two or three weeks his reinforcing bar backlog jumped from two months to five months. Most of this increase is said to be rated orders from warehouses and fabricators who are attempting to build up their stocks. The June concrete bar directive has been set at 40,000 tons. May sales of concrete bars was the second highest this year, amounting to 57,000 tons. A 4000-ton bar order for a Louisville and Nashville bridge has been awarded to Truscon Steel Co.

In addition to having placed orders for troop sleeping cars and diners, the Army car program is understood to include 57,045 cars as follows: 700 40-ton gondolas to American Car & Foundry and 800 to Ralston Steel Car Co. for France, the orders having been placed but not schedule; 6750 20-ton box cars not yet placed, also 20,000 20-ton box cars and 10,000 20-ton gondolas for France of French design for first and second quarter 1946 construction; 4000 20-ton box cars and 2000 20-ton gondolas for India of U. S. Army design for construction in the same period and 12,795 cars of various army designs not yet assigned to destination for construction in the first half of 1946. Illinois Central is inquiring for 500 50-ton box cars, 300 40-ton auto box cars, 500 50-ton flat cars and 500 50-ton low side gondolas. Boston & Maine has awarded Pullman-Standard Car Mfg. Co. 16 coach smoker lounge cars and 4 coach-baggage cars.

The national steel ingot operating rate has increased two points this week to 92 per cent of capacity from last week's revised rate of 90 per cent.

• **MAY STEEL OUTPUT DOWN**—Production of 7,477,387 tons of ingots and steel for castings during May, according to the American Iron & Steel Institute, represents a decline of about 3 per cent from production of 7,702,576 tons in May 1944. In April of this year output was 7,291,926 tons. During May, the steel industry operated at an average of 92.2 per cent of capacity as against operating rates of 92.8 in April and 97.1 per cent in May a year ago. An average of 1,687, 898 tons of steel was produced per week in May, as against 1,699,750 tons per week in April and 1,738,730 tons per week in May 1944.

• **STEEL PAYROLLS DECLINE**—Total steel industry payrolls were $146,954,800 during the month of April according to the American Iron & Steel Institute. The April payrolls represented a decline from the total of $154,976,700 paid out in the longer Month of March, but were substantially above the April 1944 total payrolls of $138,860,400. Employment likewise declined in April. The unmber of employees on the payrolls during the month average 567,200 compared with 570,100 in March and 573,400 in April 1944. Wage-earnings employees earned an average 126.4c. an hr. in April, as against 127.3c. per hr. in March and 119.0c. per hr. in April of last year. Wage earners worked an average of 46.5 hrs per week in April, which compared with 47.4 hr. per week in March and 45.9 hr. per week in April 1944.

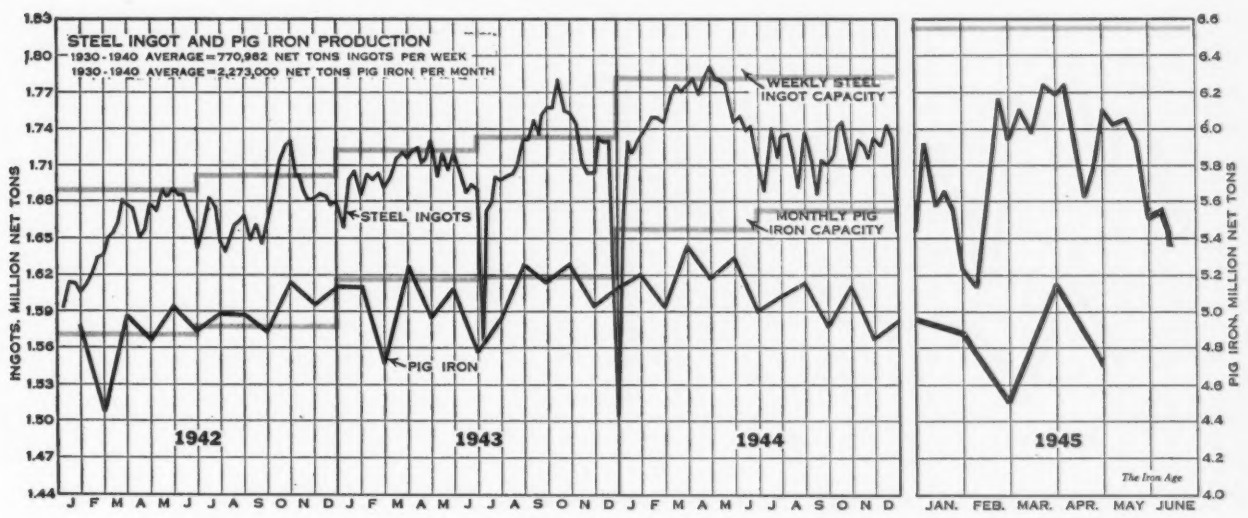
• **PASSENGER CAR APPROVAL**—War Production Board approval has been given Pullman-Standard Car Mfg. Co. for limited reconversion of its facilities to make way for railway passenger car building after July 1. An allowance of $187,783 is provided to enable the company to relocate its steel cabinet plant in new quarters, including paint and spray equipment, conveyors, and other production facilities. The grant does not cover new equipment.

• **AUTO STEEL PICTURE CONFUSED**—It is understood that the labor section of the WPB Steel Branch has figured that only 2300 men are required to make available 330,000 tons of auto sheets in the third quarter—by far the most optimistic appraisal of the situation to come to light yet. A great deal of confusion exists in Detroit mill offices over delivery dates for steel. The general viewpoint is that the automotive demands for shipments to start in July, generally the case on forging bars and other early requirements, may likely not be met on schedule, although in the same breath it is admitted that auto company pressure might cause miracles and get out the required tonnage on time. Prices on this early automotive ordering, as on other scattered civilian goods requirements, are on the same basis as for war goods needs—the levels in effect at the time the orders are handled. It is expected in Detroit that automotive buying will go back to the quarterly price basis sometime in the future, but probably not while schedules are on a limited basis. There have been scattered attempts by automobile manufacturers to protect themselves for as much as six months on going prices, but these have not met with any success at the mills so far as can be determined.

• **MORE STEEL CUTBACKS** — Another cutback in heavy and medium shell production seems to be definitely in the wind. Cutback meetings are being set up in various cities between now and the end of June. The extent of these further cutbacks is not known now, but it is believed that it may equal the cutbacks of May. Further, a cutback policy to rock bottom on Ordnance contracts is being considered for the purposes of reviewing finished production and inventories of various items. After such an inventory, new production programs on short items will follow.

• **U. S. STEEL SHIPMENTS** — Shipments of finished steel products by subsidiary companies of the U. S. Steel Corp. for May 1945 were 1,797,987 net tons. This compares with 1,722,845 net tons in April, an increase of 75,142 net tons, and with 1,776,934 net tons in May 1944, an increase of 21,053 net tons. Shipments for the first five months of 1945 were 8,522,077 net tons compared with 8,895,085 net tons in the comparable period of 1944, a decrease of 373,008 net tons.

• **FIRE DAMAGE TEMPORARY**—Fire which last week destroyed 23 Refrigerator cars in the paint shed of the Michigan City, Ind., plant of Pullman-Standard Car Mfg. Co., will not affect scheduled production of 1200 troop sleepers for the Army Transportation Corps recently awarded the company. The Army also awarded 400 kitchen cars to American Car & Foundry Co. for immediate production.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
June 5.....	92.0	95.5	82.0	95.0	94.0	104.5*	90.5*	18.0*	93.0	78.0	102.0	75.0	95.5	90.0*
June 12.....	92.0	96.0	92.0	95.0	96.0	104.5	90.5	65.0	97.5	71.0	102.0	75.0	88.5	92.0

* Revised

Steel Export Situation Clouded by Uncertainties

New York

By TOM CAMPBELL

o o o

• • • **Exportation of steel** by the free enterprise method which prevailed before the war may not come for some time according to experts in this field. All exportation today is stringently controlled by governmental agencies and most of the time companies are merely told what to send to a certain location for export without knowing the details of the ultimate destination or the buyer.

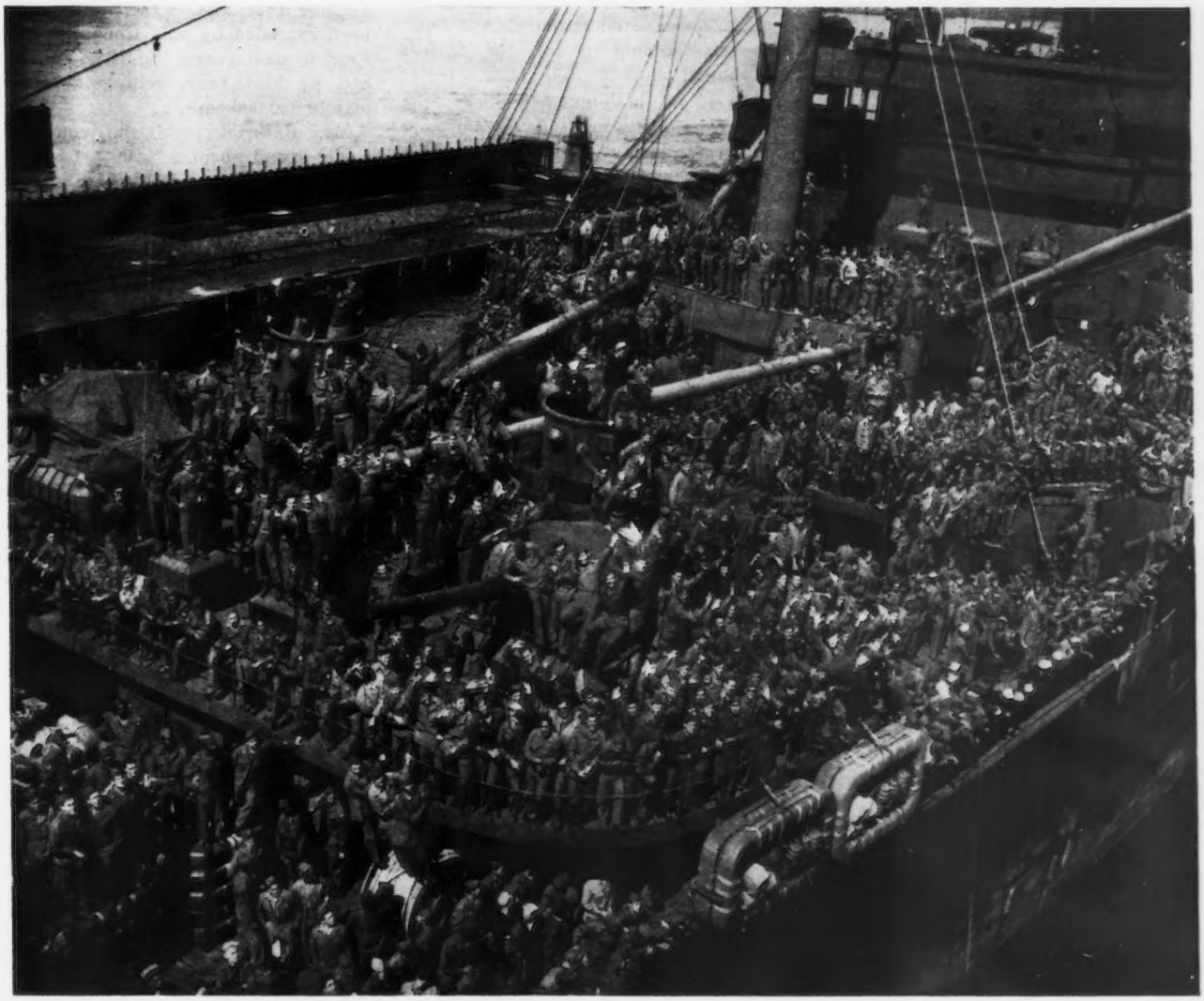
This situation which is clouded by a cloak of secrecy under the guise of military security has caused many steel observers to believe that steel exports will be rigidly controlled by a governmental agency for some time to come.

Because steel exporters have run up against a blank wall when attempting to gather information about the possible future export demand and because of the national "hubbub" over the cartel system, there seems little chance that the old American Steel Export Association which died out a few years ago will be resurrected, at least in its original form.

Before the war the American Steel Export Association operating under the Webb-Pomerene Act was allowed to discuss production, quotas and prices in the world markets exclusive of the United States. All steel companies did not belong to this association, however. While the European steel cartels might establish a quota for the association in the world markets, under the Webb-Pomerene provisions, non-members of the American Steel Export Association were perfectly free to garner any export business they saw fit.

The "sleeper" in the Webb-Pomerene Act which neutralized to some extent the participation of the American Steel Export Association was

WAR HEROES COME HOME—*Cheering soldiers aboard the new super transport* General W. P. Richardson *dock in New York. Many were veterans of the African campaign, Salerno, Anzio, Cassion, and the winter warfare in the Italian mountains.*



that the latter was prohibited from restraining trade as far as non-members were concerned. Under today's conditions where the Department of Justice is out on a monopoly hunt no company would be willing to belong to an association which could even remotely suffer from unfounded suspicion of trafficking in "restraint of trade."

While steel exporters are too frustrated at the present time to entertain definite plans for an association in the future, such an organization, if formed, would certainly bear no resemblance to the prewar vintage. Some former members of the previous steel export association believe that if a new group is formed it will be composed of all steel companies blessed by the Webb-Pomerene Act, but operating without set quotas in the world market.

Under such a setup back-stabbing would be reduced to a minimum and the protection of the Webb-Pomerene Act would allow members to discuss how the quotas set for American steel manufacturers would be met among the membership. Whether such an organization will ever be formed, however, is currently highly doubtful in view of the belief that government agencies of the world may supplant private commercial practice in the matter of exports from one country to another.

Although the war in Europe is officially over exports of steel and other durable products are still being handled by governmental agencies, frequently at the expense of American domestic demand. For instance the American railroad transportation system has been heavily battered by unprecedented operations and is badly in need of repairs and replacements, yet through the Army procurement and through the United Nations Relief and Rehabilitation Administration orders for freight cars and locomotives are being rushed for foreign delivery.

If the United States is to continue to supply steel and products made from steel for the satisfaction of European rehabilitation or demand, observers here believe that recovery in this country will be retarded. They point out that the demand from domestic steel consumers in this country after the war will be so great that steel mills will have to ration supplies and that any governmental edict calling for a certain percentage of U. S. steel production for foreign exports would only serve to further retard the rehabilitation of domestic economy in this country.

$40 Million Per Month Surplus Disposal; Largely Consumer Goods

Washington

• • • **Total surpluses** may approximate $100 billion original cost to the government, according to the second quarterly report submitted to Congress by the Surplus Property Board.

Reviewing the record of the SPB and other disposal agencies, the report says that since June, 1944, the total value of surplus declarations was $1,575,000,000 of which approximately 17 per cent has been sold, around $164 million having been realized from the sales.

By the end of March inventories of surplus on hand had risen to $1,399,000,000, 69 per cent of which constitutes unsalable aircraft and related equipment which was declared surplus since June, 1944. Disposals are proceeding at the rate of $40 million a month with consumer goods, machine tools, construction materials and small vessels accounting for the fastest turnover.

Speaking of consumer goods, the report said that no other class of surplus commands so ready a sale in this period of short supply, or arouses so wide a public interest. The report further said that the policy in first importance in disposing of these goods is that it be done quickly; prompt disposal will assist in relieving current shortages, will get the best price for the government and will clear the way for expanded civilian production.

Speed in disposal of surplus plants and machine tools must be subordinated to care and judgment it was pointed out, to guard against monopoly, to convert to useful production, to safeguard employment and to protect a war reserve policy.

Pointing out that ample protection is being afforded small business, the report stated that 68 per cent of all commercial sales of surplus consumer goods have been in amounts of less than $500. A large increase in purchasing by the States is anticipated in view of the fact that all but five have recently organized central purchasing offices.

The report specified that while methods of selling surpluses may differ, the two basic principles being followed are to encourage distribution near the trade level as near to the consumer as possible and to sell at a specified price wherever possible. A compliance system is being set up to prevent frauds and abuses.

The Board found that a single, overall, regulatory body is indispensable to the efficient sale of surpluses and, that ordinary trade practices should be used as much as possible, including sale in reasonable sized lots and the use of paid advertising.

Pontiac Planning For 500,000 Units in Year

Detroit

• • • **Pontiac Motor Division** of General Motors Corp. is making plans to produce and sell 500,000 cars in the first year of unrestricted automobile production, it was stated by D. U. Bathrick, general sales manager.

This would be far above previous Pontiac levels and, in fact, would have been exceeded by only Chevrolet and Ford in past years. In 1941 Pontiac had its best year, selling approximately 330,000 cars.

Mr. Bathrick said the company would spend about $35,000,000 of the $500,000,000 General Motors has allocated for reconversion. Approximately $7,000,000 will go into new buildings and rehabilitations of present structures.

Employment, according to Mr. Bathrick, is now about 3000 under the prewar peak. Mr. Bathrick said reconversion and remaining war assignments will require a minimum of 5000 employees.

Skuce Gets New WPB Post

Washington

• • • **W. C. Skuce**, Schenectady, N. Y., who has been executive officer to the operations vice-chairman of WPB, has been designated deputy operations vice-chairman. Mr. Skuce will succeed Arthur J. McComb, Montclair, N. J., resigned, who will return to his position as a vice-president of the Otis Elevator Co., New York.

John B. Campbell, Chicago, WPB's deputy vice-chairman for production, is leaving shortly on a mission to Europe for WPB, and Robert M. Hatfield, Lakewood, Ohio, has been designated to succeed him. Certain of Mr. Hatfield's present duties as special assistant to the operations vice-chairman are being consolidated into the Automotive Division.

Canada Starts to Dispose Of Government Owned Plants and Equipment

Ottawa

• • • **C. D. Howe,** Minister of Munitions and Supply, and also acting as Minister of Reconstruction, has started to dispose of Canadian government-owned plants, tools and equipment that were erected and installed during the war years. Already eight such plants have been sold with the recovery price running approximately 50 per cent of the original cost of the building, while on tools and equipment the recovery price is about 35c. on the dollar. In disposing of these plants the government is selling to companies most likely to continue them in operation and provide jobs for Canadian workers. The plants already disposed of represented an expenditure of $12,700,000 whereas the selling price is $5,800,000. Following are the plants that have been sold through the government agency up to this time.

The metallic magnesium plant which was under the direction of the Crown Co., Wartime Metals Corp., on which the government advanced $3,400,000 and has a capacity of 10 tons of magnesium per day, has been sold to Dominion Magnesium Ltd. at a price of $1,400,000, of which $100,000 is payable in cash and the balance at the rate of 1c. per lb. of magnesium sold. The plant is located at Haley's Corners, Ont.

Canadian Westinghouse Co. has purchased the west plant gun building which was operated by Hamilton Munitions Ltd., a subsidiary of Canadian Westinghouse, Hamilton, at $700,000, whereas the original cost of the building was $1,324,000. The building and equipment represented an expenditure of approximately $10,000,000. It is understood that Canadian Westinghouse now is negotiating for a portion of the tools and equipment in the plant.

Nichols Chemical Co. has purchased the Valleyfield sulphuric acid plant at Valleyfield, Que., at $700,000, which originally cost $1,336,000.

Steinbergs Wholesale Groceterias Ltd., Montreal, has purchased the land and premises formerly occupied by Canadian Propeller Ltd., at a purchase price of $500,000, whereas the original cost was $914,000.

Parkers Fountain Pen Co. has purchased the government-owned building which was erected on land owned by the Parker Co. at a price of $13,000 against the original cost of $25,000.

Canadian General Electric Co. has purchased government-owned buildings adjacent to its own plant at Peterborough, Ont., at a price of $1,150,000, compared with the original price of $1,927,000. Canadian General Electric also is negotiating for the purchase of some of the tools and equipment in the plant.

Canadian Triangle Wire & Cable Co., Toronto, has purchased the land and building at 4006 Dundas Street, West, for $80,000, which originally cost $157,000.

Corning Glass Works, Corning, N. Y., has purchased for $150,000 cash the plant known as the Mobile Assembly Building of Research Enterprises Ltd., at Leaside, Ont., which originally cost $522,000.

Ford Motor Co. of Canada Ltd. has purchased machine tools and equipment now in its possession at its plant at Windsor for $675,000 which originally cost the government $1,602,000.

While the sale of the above plants has been announced, it is stated that some of thees are still being operated on war production, thus they will not be turned over to the purchasers until war programs have been completed.

Canada Shipping Aluminum to Spain

Montreal

• • • **Shipment of 1500** metric tons of aluminum ingot to Spain was disclosed this week by the Aluminum Co. of Canada following the announcement that export permits had been announced last week. Completion of arrangements for the immediate shipment of the remainder of the 3500 authorized metric tons was also disclosed.

The permits for the exports were arranged, according to the Canadian Department of Trade and Commerce, after consultation with economic warfare officials in the United States and Great Britain.

The Canadian firm denied allegations by political leaders, presently embroiled in a near election frenzy, that contracts for annual delivery of 20,000,000 lbs. of ingot to Spain have been negotiated.

Aircraft Production Continues

Cleveland

• • • **Fisher Body's** two Cleveland plants, its plant in Memphis, Tenn., and the division's Detroit aircraft unit, will continue exclusively in B-29, B-25 assemblies production, according to T. P. Archer, General Motors vice-president and general manager of the Fisher Body Division. Reconversion of some other plants to automobile body production under War Production Board allocations will begin immediately.

PERMANENT RHINE BRIDGE—*Setting about the task of rehabilitating Germany, British troops have built a permanant bridge across the Rhine River, capable of taking the heaviest loads for long periods. Here a train is passing over the bridge carrying supplies.*

TCI&R Blast Furnace Center Of South's Most Costly Steel Work Stoppage

Birmingham

• • • **The unauthorized strike** of Tennessee Coal, Iron and Railroad Co. blast furnace workers that has halted all of the iron and steel production by the U. S. Steel subsidiary here and has forced down most of its finishing mills remained in progress the first of the week.

On Monday, the eleventh day of the walkout—the strike was referred to the National War Labor Board by the fourth Regional War Labor Board at Atlanta.

It was referred to the national board at Washington after M. T. Van Hecke, fourth regional board chairman, asserted that the United Steel Workers of America, CIO, had "failed without cause to abide by a WLB order to end a strike at the Tennessee Coal, Iron and Railroad Co., Birmingham, Ala."

The fourth regional WLB chairman said he could not help but feel that the union had fallen down in its responsibility "which should have required it to remove those local officials responsible for this situation before it got out of hand."

At a meeting attended by union officials at Atlanta June 8, the regional board ordered the strikers to return to work June 11 and if the strikers refused the union officials were directed to return to Atlanta and show cause why.

The blast furnace employes, striking because an incentive pay plan had not been put into effect, met here June 10 and voted overwhelmingly against going back to their jobs.

At the Atlanta meeting the following day, union officials said they believed the men would have returned to work if they had been assured the company would take them all back.

Meanwhile, approximately 10,000 company employes, including the 1,100 blast furnace workers were idle and only the tin plate mill, cotton tie mill and merchant mill at Fairfield out of the company's finishing units were operating. Mills down included blooming mills at Ensley and Fairfield steel works; rail mill and shell forging plant at Ensley; plate, sheet, wire and structural mills at Fairfield and Bessemer rolling mill.

As of 11 p.m. June 11, pig iron lost from the strike totaled 57,468 tons and steel ingots lost totaled 66,982 tons.

Steel Shipments To Shipbuilding Industry Show Sharp Decline

New York

• • • **The first quarter** of 1945 brought a sharp decline in shipments of finished steel products to the shipbuilding industry, which has held the title of the nation's largest wartime consumer of steel, according to the American Iron & Steel Institute.

Merchant and naval ship construction received 1,267,386 tons of steel in the first quarter of this year, only 8 per cent of the total of 15,414,000 tons shipped to all consuming industries during the quarter. In the corresponding months of 1944 shipyards obtained 3,221,000 tons of steel, nearly 20 per cent of the total tonnage of steel products delivered in that period.

Jobbers, dealers and distributors of steel received 2,210,233 tons in the first quarter of 1945, an increase of about 361,500 tons from the 1,848,732 tons they obtained in the corresponding part of 1944. The "miscellaneous industries and export" classification received 3,673,434 tons against 3,032,040 tons in first quarter of 1944, the increase reflecting chiefly greater shipments of steel for shells, bombs, projectiles and ammunition for small arms.

First quarter shipments to the construction, container, machinery and stamping industries showed increases over the first quarter of 1944. Shipments to railroads, the oil, gas and mining industries, agricultural implement makers and the automotive and aircraft industries were down slightly, as compared to first quarter of 1944.

An increase of around 600,000 tons over first quarter of 1944 was reported in shipments to the "miscellaneous industries and export" classification which includes ordnance and certain other direct war shipments.

Total shipments in first quarter of 1945 were about 905,000 tons below the total of 16,319,000 tons shipped in first quarter of 1944.

WPB Studies Time Lag

Washington

• • • **Preliminary results of a WPB** survey indicate that there is an average time lag of two weeks between contract cancellations and notification of steel mills by the contractors affected.

The purpose of this check which is being made by WPB field representatives is to bring about prompt cancellations of ratings and authorized CMP orders pertaining to cancelled war contracts and thereby open up mill books.

Of the several thousand larger contractors included in the survey, many reported that the paperwork involved was the principal factor causing the delay.

The prompt return of unused allotments, it was pointed out, will greatly assist the WPB in determining the effect of military cutbacks on the supply of controlled materials for the third and fourth quarters. WPB has emphasized that it will be unable to relax many of the remaining controls until it can be sure of available supplies to accomodate unrated orders.

Allegheny-Ludlum's Strike Affects 2300

Buffalo

• • • **Output of the** Allegheny Ludlum steel plant at Dunkirk was halted this week by a strike of 2,300 production workers, which began last Friday with a walkout in the wire mill. Officers of the CIO-United Steel Workers asserted the company had violated its contract with the union by failing to lay off a group leader in the wire mill who had been suspended from membership for four weeks after a hearing on charges of using abusive language to a woman worker.

Industry Will Build Cars

Chicago

• • • **The automotive industry** will definitely build its quota of 215,000 passenger automobiles this year, Henry P. Nelson, WPB reconversion coordinator for the automotive industry, said here Monday.

He predicted that there will be three times the expected amount of total steel capacity free in the third quarter of this year. However, sheet mill capacity still wil lbe tight. Nelson predicted that autos would be removed from formal rationing by January, 1946.

Complete Steel Expansion For War to Be Described in Hauck Report

Washington

• • • **A complete report** on the $2,500,000,000 "Steel expansion for war" program outlining in detail the role played by steel in building this nation into the greatest arsenal for democracy the world has ever known, will be available for distribution on June 18, WPB has announced. The report was prepared by W. A. Hauck of the WPB Steel Division.

This expansion program lifted the steel ingot capacity of the country from around 80,000,000 tons annually to around 95,000,000 tons. The cost of this huge project was borne almost equally by government and private industry. Industry financed facilities totaled $1,273,201,366 and government financed $1,311,742,652, making a grand total of $2,584,944,018.

Private industry contributed more than 3000 projects to the expansion program. Government projects while fewer in number include large plants such as the Geneva Steel Co., Geneva, Utah; the Houston, Tex., plant of American Rolling Mill Co. (partly government-owned), Chicago plant of Republic Steel Corp., Homestead plant of Carnegie-Illinois Steel Corp. and the Kaiser Co. plant at Fontana, Calif., which was RFC financed. Also, a new blast furnace plant located at Daingerfield, Tex., which is government owned but which is leased by the Lone Star Steel Co. Some other government projects were "scrambled" with privately owned properties as they were not capable of economic operation as separate and independent units. All of such "scrambled" facilities are located in established steel production areas.

Other highlights of the report include: (1) A description of the more than 100 per cent increase in plate production to more than 12,000,000 tons annually, which provided the basic steel product needed for the Maritime ships, naval vessels, as well as tanks, heavy duty trucks and numerous other essential war purposes, (2) The expansion in alloy steels vitally needed for special war implements. (3) A discussion of the development of sponge iron production. (4) Expansion of steel production facilities in the West and particularly the West Coast. A combined total of $361,367,597 was spent by government and industry on western steel projects, accounting for 19.4 per cent of the total of $1,862,131,626 spent on steel projects in the United States.

The exact amount of production which has been obtained from the increased facilities cannot be figured, the report said, inasmuch as no separate accumulative records were maintained or reported to the WPB by the steel industry of the ingot tonnage realized from individual enlarged or new open hearth furnaces and electric furnaces included in the steel expansion program.

However, 35,325,802 ingot tons of steel were produced from expanded facilities as indicated by production figures for the four-year-period of 1941 through 1944.

A total of 11,592,465 tons were realized in 1944, the report indicated. Using October, 1944, production as a basis (with major portion of expanded facilities in operation) annual ingot production has been estimated at 12,758,603 yearly rate from new capacity.

New production figures recently made available and not included in the steel expansion report, offer a good insight into the productive capacity of two of the largest western plants constructed under the expansion program.

They show that in the first four months of 1945 the Geneva Steel Co. produced 234,691 tons of steel and the Kaiser Company 139,114 tons.

Broken down by products the Geneva output was as follows:

Shell steel billets, 52,302; semi-finished steel, 615; plates, 163,020; structural shapes, 18,754.

The Kaiser output by products in the same period was:

Hot rolled bars, 1080; shell steel billets, 51,049; semi-finished steel, 1849; plates, 82,230; structural shapes, 2906.

Million Pounds Of Aluminum Released

Washington

• • • **Well over** 100,000,000 pounds of aluminum a quarter, more than was used by manufacturers at their prewar peak, will be turned over to industry for civilian production starting this week, in an action two weeks ahead of schedule.

Confronted by mounting stockpiles of the metal, and anticipating even greater supplies as aircraft reduction programs go into effect, the War Production Board has decided not to wait for the official date of July 1, and instead is expected to take the step before the week is up.

The measure has been technically described as the "open-ending" of the Controlled Materials Plan, which means that all steel, aluminum and copper not required for war production will be authorized for the manufacture of "unrated" or civilian orders. Recent developments in the aluminum situation have enabled the WPB to advance the original date, informed sources explained.

Suddenly provided with more aluminum than the whole domestic economy used before the war, officials of the WPB's Office of Civilian Requirements asserted that manufacturers of consumers' goods would be greatly helped by the new supply, but added that the shortage of facilities would impede their efforts to use it.

Farm Equipment Hits One Billion Mark

Washington

• • • **Despite wartime** restrictions, the factory value of farm machines and equipment, attachments and parts produced in 1944, exceeded $1,000,000,000 for the first time in history, according to the Bureau of the Census, in its annual report on farm machinery.

In 1944, factory production of such equipment was valued at $1,080.000,000 dollars, compared with $613,000,000 in 1941, the year just before the United States entered the war. Value was approximately twice that for 1929.

While a fairly large part of the increase in value in 1944 was due to price factors and production of tractors for military use, the principal fact remains that the industry produced greatly increased quantities of equipment for domestic farm use.

The large increase in production of farm machinery reflects the trend toward increased total farm acreage and fewer but larger farms, as indicated in preliminary tabulations from the 1945 Census of Agriculture. It likewise emphasizes the tendency among farmers to mechanize to increase production, reduce operating costs, and substitute for manpower which either has been drafted into the armed forces or gone to work in war plants.

Reconversion Orders Issued Cover Return Of Unused Allotments

Washington

• • • **Each a piece** in the reconversion pattern, WPB has issued the following:

Interpretation 31 to CMP Regulation 1, calling the attention of manufacturers to their responsibility of observing regulations covering cancellations of orders with ratings and the return of allotments of controlled materials.

Direction 71 to CMP Regulation 1 changing rules applicable to operations of steel producers after July 1, when CMP will be "open ended" for delivery of unrated orders.

Direction 1 to M-21, advancing from June 30 to June 16, the date by which steel warehouses must cancel orders for sheet steel in excess of recently established third quarter quotas.

Discussing Interpretation 31, WPB said that it is necessary that ratings and authorized controlled material orders no longer needed for their original purpose be promptly canceled so as to open up suppliers' order books. Until it can be certain of the existence of substantial supplies that will flow without ratings, WPB said, it will be unable to relax many of its remaining controls.

It was also pointed out that it is important that allotments be promptly returned to the source, which may be the customer or WPB Industry Division. The return of unused allotments, it was explained, is the only definite way WPB can determine the effect of military cutbacks on the supply of controlled materials. Rapid relaxation of WPB controls, it was stated, depends upon early and accurate information of supply and demand for materials during the third and fourth quarters.

The interpretation, available at WPB local field offices or the WPB Business Services Branch in Washington, outlines what actions must be taken by manufacturers of Class A and Class B products upon receipt of cancellations and cutbacks and by any other manufacturer who has received and authorized production schedules or who, upon receipt of a cancellation or cutback, extends his customer's rating.

The direction on the open-ending of CMP outlines how a producer may obtain steel for further conversion, effective July 1, and points out that WPB will no longer issue FC (further conversion) allotments to steel producers not operating under production directives for further conversion approved on Form CMP-4B and that all such allotments for the third quarter and thereafter have been canceled.

A producer, not operating under production directives, the direction explains, may use the FC-1 allotment symbol to replace conversion material used in filling authorized controlled materials orders, and production directives under which certain producers operate will be adjusted to reflect only the order load of authorized controlled material orders. It also tells how a producer will get conversion material to fill an order bearing a Z-3 allotment symbol.

Direction 6 to CMP Regulation 1 was also changed. For operations before July 1, there is a change concerning "producers exchange" that explains how a steel producer shall differentiate between firm authorized controlled material (non-deferable) orders and those where he intends to deliver the steel on Z-3 (deferred) orders and June 30, 1945.

The direction advancing the date for steel warehouses to cancel sheet steel orders in excess of third quarter quotas requires steel producers to lift from their rolling schedules for in that period any warehouse sheet orders that were placed before May 1 if the warehouse has not revalidated them in writing by June 16.

Advancing the mandatory cancellation date by two weeks, WPB said, will enable the Steel Division to get a better picture respecting open space on mill rollings and should enable those warehouses that have not been able to place orders for their full third quarter quota to do so.

Warehouses have until Aug. 1 to cancel or revalidate orders for sheet steel to be delivered from mill scheduled rollings during the fourth quarter.

AMERICAN IRON AND STEEL INSTITUTE

Production of Open Hearth, Bessemer and Electric Steel Ingots and Steel for Castings

YEAR 1945

Based on Reports by Companies which in 1944 made 97.9% of the Open Hearth, 100% of the Bessemer and 86.7% of the Electric Ingot and Steel for Castings Production

Period	Estimated Production—All Companies								Calculated weekly production, all companies (Net tons)	Number of weeks in month
	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL			
	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity		
January	6,468,815	90.5	379,062	76.0	358,346	77.3	7,206,223	88.8	1,626,687	4.43
February	5,967,842	92.4	347,227	77.1	339,520	81.1	6,654,589	90.8	1,663,647	4.00
March	6,927,377	96.9	398,351	79.8	382,237	82.4	7,707,965	95.0	1,739,947	4.43
Quarter	*19,364,034*	*93.3*	*1,124,640*	*77.6*	*1,080,103*	*80.2*	*21,568,777*	*91.6*	*1,677,199*	*12.86*
April	6,541,097	94.4	372,952	77.2	377,877	84.1	7,291,925	92.8	1,699,750	4.29
May	6,682,597	93.4	402,081	80.6	392,709	84.7	7,477,387	92.2	1,687,898	4.43
June										4.29
Quarter										

YEAR 1944

Based on Reports by Companies which in 1944 made 97.9% of the Open Hearth, 100% of the Bessemer and 86.7% of the Electric Ingot and Steel for Castings Production

Period	Estimated Production—All Companies								Calculated weekly production, all companies (Net tons)	Number of weeks in month
	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL			
	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity		
January	6,770,423	97.2	439,551	85.4	382,629	84.4	7,592,603	95.7	1,713,906	4.43
February	6,410,914	98.5	409,781	85.2	373,314	88.1	7,194,009	97.0	1,737,683	4.14
March	6,977,466	100.1	455,368	88.5	393,423	86.8	7,826,257	98.6	1,766,649	4.43
1st Quarter	*20,158,803*	*98.6*	*1,304,700*	*86.4*	*1,149,366*	*86.4*	*22,612,869*	*97.1*	*1,739,451*	*13.00*
April	6,789,422	100.6	437,472	87.8	366,794	83.5	7,593,688	98.8	1,770,090	4.29
May	6,879,253	98.7	437,444	85.0	385,879	85.1	7,702,576	97.1	1,738,730	4.43
June	6,463,049	95.8	419,699	84.2	351,509	80.1	7,234,257	94.1	1,686,307	4.29
2nd Quarter	*20,131,724*	*98.4*	*1,294,615*	*85.6*	*1,104,182*	*82.9*	*22,530,521*	*96.7*	*1,731,785*	*13.01*
1st 6 months	*40,290,527*	*98.5*	*2,599,315*	*86.0*	*2,253,548*	*84.7*	*45,143,390*	*96.9*	*1,735,617*	*26.01*
July	6,743,812	96.6	415,543	80.9	339,032	74.6	7,498,387	94.3	1,696,468	4.42
August	6,715,835	95.9	429,672	83.5	353,406	77.6	7,498,913	94.1	1,692,757	4.43
September	6,501,944	96.1	398,058	80.1	335,109	76.2	7,235,111	94.0	1,690,446	4.28
3rd Quarter	*19,961,591*	*96.2*	*1,243,273*	*81.5*	*1,027,547*	*76.2*	*22,232,411*	*94.1*	*1,693,253*	*13.13*
9 months	*60,252,118*	*97.7*	*3,842,588*	*84.5*	*3,281,095*	*81.8*	*67,375,801*	*96.0*	*1,721,405*	*39.14*
October	6,860,921	98.0	420,105	81.6	339,859	74.7	7,620,885	95.6	1,720,290	4.43
November	6,572,454	97.0	403,908	81.0	302,357	68.6	7,278,719	94.3	1,696,671	4.29
December	6,678,460	95.6	373,322	72.7	314,388	69.2	7,366,170	92.6	1,666,554	4.42
4th Quarter	*20,111,835*	*96.9*	*1,197,335*	*78.4*	*956,604*	*70.8*	*22,265,774*	*94.2*	*1,694,503*	*13.14*
2nd 6 months	*40,073,426*	*96.5*	*2,440,608*	*80.0*	*1,984,151*	*73.5*	*44,498,185*	*94.2*	*1,693,878*	*26.27*
Total	80,363,953	97.5	5,039,923	83.0	4,237,699	79.0	89,641,575	95.5	1,714,644	52.28

Note—The percentages of capacity operated are calculated on weekly capacities of 1,572,755 net tons open hearth, 116,182 net tons Bessemer and 102,350 net tons electric ingots and steel for castings, total 1,791,287 net tons; based on annual capacities as of Jan. 1, 1944, as follows: Open hearth 82,223,610 net tons, Bessemer 6,074,000 net tons, Electric 5,350,880 net tons. Beginning July 1, 1944, the percentages of capacity operated are calculated on weekly capacities of 1,590,042 net tons open hearth, 116,182 net tons Bessemer and 102,757 net tons electric ingots and steel for castings, total 1,798,981 net tons; based on annual capacities as follows: Open hearth 82,604,600 net tons, Bessemer 6,074,000 net tons, Electric 5,372,150 net tons.

Aluminum Sheet Goes to Navy

Chicago

• • • **Eight million lb.** of aluminum sheet has been sold to the Navy for Pacific theatre construction work. Fabricated for British use on lend lease, the metal was returned to the United States when the critical aluminum shortage was eased.

Symington Outlines Modified Objectives In Surplus Disposal

Washington

• • • **W. Stuart Symington** has been appointed chairman of the Surplus Property Board succeeding Guy M. Gillette. Mr. Symington was formerly president of the Emerson Electric Co., St. Louis.

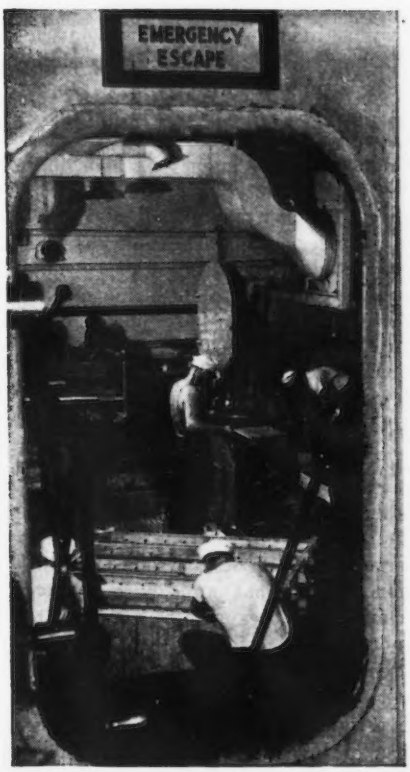
With cumbersome provisions of the Surplus Property Act recognized, it has been suggested that amendments be made dispensing with review by the Attorney General of sales involving property which cost the government $1 million or more; eliminating the report to Congress on contemplated sales of plants which cost $5 million or more, and revision of the leasing provisions of the act to permit part payment by the government of reconversion costs in plants leased to private operators. However, it may be some months before these changes are brought about if the Administration submits them to Congress.

It has also been reported that a new regulation pertaining to the disposal by DPC of plants and facilities prior to their being declared surplus may be forthcoming. Officials report that current negotiations are underway for the sale of plants with an aggregate value approaching $5 billion.

SPB officials, anxious to get the property disposal job in high gear, will inaugurate a price policy applicable to consumer goods principally. The plan is to establish prices for the wholesaler, retailer and consumer levels and to circumvent wherever possible the necessity of negotiating with the prospective purchaser individually. Price negotiations for industrial plants will, however, necessarily continue inasmuch as each factory presents its own problem requiring special treatment.

WPB has recently come into the surplus property picture with the committee on Period One conducting a survey to determine the reconversion equipment needs of war contractors which, when compared with expected surpluses, will give some idea as to future production needs. Apparently discounting the theory that the Surplus Property Act should be a safeguard against the larger companies monopolizing the market, it is said that the smaller enterprises have ambitious plans to secure needed equipment as it becomes available through SPB.

FLOATING DEPOT—*Seen through the hatchway of a watertight bulkhead, part of one of many floating aircraft repair units, is a wood mill. In addition the unit contains many shops, such as machine, welding, electrical, sheet metal, radio, radar, battery, and all necessary equipment to repair and maintain Superfortresses.*



More Shell Cuts Now Anticipated

Pittsburgh

• • • **Ordnance cancellations** have abated somewhat during the past two weeks, but some observers feel that this is only a lull before a greater storm. It was pointed out here that there is increasing consideration of the possibility of cutting to real rock bottom in Ordnance contracts and then taking stock of what is needed. After this has been accomplished, it is believed that there might be a minor production spurt in about two to four months.

Look out for another cut in shell production between now and the end of the month. Cutback meetings are scheduled throughout the shell production areas and the cuts of about a month ago might be almost duplicated.

The four pound bomb contracts have been cut considerably in the past couple of weeks. Another producer in this area, Walters Mfg. Co., Oakmont, Pa., is reported to have been completely taken out of this work, which made up about 90 to 95 per cent of the company's business. Prior to the war, the company made metal furniture. A sub-contractor on this contract, McKinney Mfg. Co., Pittsburgh, also was cut back by the Walters cut, but it is believed that McKinney has other activities that will replace the cutback.

National Munitions Co., at Eldred, Pa., lost its loading and packaging contract on a 4.2-in. chemical shell. This plant is a new one and one of the most modern plants of its kind in the country.

The hermetically sealed ammunition container program is one of the really hot items here. No production orders have been placed, but samples are being constructed for tests and examinations. The units are made of 3/16-in. plate, welded with plate, with a hermetically sealed-in nitrogen atmosphere. The unit can be used both for shipping or storing ammunition and is said to be a sure-fire method of guarding against atmospheric or climatic deterioration. Some 350,000 tons of plates are expected to be needed in the first production order.

Canadian Controls Lifted

Toronto

• • • **C. D. Howe**, Minister of Munitions and Supply, announced that all metals control restrictions on the mining of gold and other metals or minerals have been removed. The original order designed to conserve manpower and machinery, prohibited all expansions of existing mines and development of new properties after June 22, 1942, except by metals control permit. The rescinding of this order means that all restrictions on the sinking of mine shafts, the expansion of underground work and the opening of new mines, have been lifted. Mining operators will be able to lay plans to begin new development. There is, however, the subject of labor in connection with proposed development programs for mining properties. Labor continues under strict control by National Selective Service and it may be some months before the new mine development program can get underway.

Revocation Orders

L-30-3-e—Aluminum cooking utensils.

L-97-a-1—Railroad equipment.

L-157 (Schedules 1-2-4-5-7)—Hand tools of various kinds, heavy forged tools and wheelbarrows.

L-326 (Schedules 1-2-3) — Power driven saw blades, wide and narrow band saws, etc.

L-42—Plumbing fixtures.

L-123 — General industrial equipment.

L-236 (Schedule 1)—Builders' finishing hardware, cabinet locks and padlocks.

L-5 — Domestic mechanical refrigerators.

L-123 — Covered production and distribution of 26 specific items of general industrial equipment.

M-160—Allocation control of beryllium.

L-157 (Except Schedule 8)—Hand tools simplification. (Schedule covers various types of wood-boring bits).

L-193—Distribution of and restricting materials used in production of conveying machinery and reequipment for transmission of mechanical power.

M-23-a—Required monthly reports on sales of vanadium in excess of 500 lb.

M-39—Required monthly reports on sales of cobalt in excess of 1000 lb.

L-103-b (Direction to Supplementary Order)—Prohibited use of aluminum against CMP allotments for 1945 second quarter for manufacture of closures, except those used for packing products listed in Schedule B of L-103.

M-21-b-2 (Direction 4)—Established allocation of steel for American Red Cross for disaster relief. Provisions of order incorporated in New Direction 4 to M-21.

L-7-c—Controlled production of domestic ice refrigerators.

McKee Declares Dividend

Cleveland

• • • **At a meeting** of the directors of Arthur G. McKee & Co., a dividend of 75c. per share was declared on the Class "B" common stock of the company payable on July 2 to stock of record June 20, 1945. Including this dividend, a total of $2.25 will have been paid on this stock during 1945. The next meeting for consideration of dividends will occur early in September.

Disposal of Surplus Property May Cause Abuses, SPB Cautions

Washington

• • • **Attempts at fraud,** favoritism, racketeering, evasion of law and similar abuses may be expected when billions of dollars of surplus property are being disposed of, the Surplus Property Board warned recently. Although surplus property regulations are drafted with care to prevent abuses, compliance measured also will be necessary, the board said.

The board's policy, it was said, is to prevent by periodic surveys all such abuses or to detect them before they asssume serious proportions. Its compliance staff, which has been established under Robert T. Amis, has made arrangements for the prompt reporting of offenses to the proper Federal criminal enforcement agencies. Another function of the board's compliance system will be the enforcement of the policies and provisions of the Surplus Property Act as promulgated in SPB regulations.

Complaints and information on irregularities, the board says, should be sent to the Compliance Division, Surplus Property Board, Washington 25, D. C. The paramount purpose of surplus property compliance is to assure that orderly, efficient, honest disposition will be made under the provisions of the act. Surplus property compliance and investigation extends to all federal agencies involved and employees making disposals as well as to buyers making irregular purchases of fraudulent resales.

The board's compliance staff, it was said, will make periodic surveys of all disposal points in the United States or abroad. The surveys will include examination of records of past and current transactions and interviews with disposal personnel, purchasers, and local trade or business groups, which may be expected to be conversant with the business community's viewpoint regarding surplus disposal in a given area. The information obtained will be used to correct administrative as well as disposal deficiencies, and in effect will provide a day-to-day review of disposal policies and actual disposal activities.

In addition, each agency designated by the board to dispose of surplus property is setting up its own compliance staff or utilizing available investigative facilities within its organization. These disposal agency compliance units will perform functions similar to those of the board's compliance staff but will be confined to the more specialized operations of the respective agencies. A system of checking proposed investigations will eliminate unnecessary duplication of investigation between the agencies and the board, but the board itself may make separate investigations of particular situations to insure an independent decision.

Arrangements have been made for the Department of the Interior, the chief disposal agency in the territories and possessions, to conduct compliance activities in those areas. Disposals of surplus property in foreign countries, which are expected to be made primarily through the Army-Navy Liquidation Commission, present important problems of compliance in view of foreign rehabilitation objectives and the national policy involved. Arrangements have been concluded between the board, the War Department, and the ANLC whereby the Inspector-General of the Army will exercise compliance functions for foreign disposal.

Special compliance problems, it is argued, will arise from the sale of excess property by owning agencies. The Surplus Property Act permits owning agencies to sell, without declaring surplus, contractor termination inventories, for war purposes; salvage, scrap, and waste; property beyond economical repair or inseparable from the agency's responsibilities, and nominal amounts of property. To maintain proper checks on these sales, compliance units are being established within the owning agencies similar to those in the disposal agencies. Where one agency, such as the United States Maritime Commission, is both owning and disposal agency, it will of course require but one compliance staff.

In cases where there is indication of false or fraudulent advertising or other violation of the fair trade laws, appropriate information will be referred to the Federal Trade Commission. Cases that appear to involve criminal statutes will be referred to appropriate criminal enforcement agencies. These agencies themselves will determine further action. The investigative staffs of the Federal Bureau of Investigation, the Post Office

Department and the Department of the Treasury are cooperating with the board and with the disposal and owning agencies in this respect.

Cooperative arrangements are being worked out on a national and local basis with private groups, trade associations, or better business organizations familiar with the prevention of harmful trade practices. These groups, through their contact with substantial numbers of prospective surplus property buyers, large and small, will provide valuable assistance to the board and the disposal and owning agencies in assuring that immediate and factual knowledge of unsatisfactory surplus property transactions is obtained.

Civilian Production Priorities Limited

Washington

• • • **Production of civilian** items above the levels already approved for the third quarter will have to be made without priorities assistance and with materials bought on the "free" market, WPB announced on June 9. The board set forth this policy in a new internal document. Under this policy WPB will not grant supplemental allocations of controlled materials beyond those made for the third quarter, except when absoutely necessary to assure needed additional production of items of the highest urgency to the civilian economy.

This action, WPB said, is designed to "wean civilian industry away" from a dependence on Government allocations now that cutbacks in war production are freeing increasing amounts of materials previously needed almost exclusively for the war and war supporting efforts.

The new document establishing WPB's weaning policy has been designated "General Program Order No. 5-10, amended, entitled: Programming Production for Non-Military Requirements."

Conservation Order Modified

Washington

• • • **Conservation Order** M-81 has been amended by WPB to exempt deliveries to the Army and Navy from the prohibition against the manufacture and use of tinplate or terneplate cans with ears or bails (handles). The other manufacturing and use except prohibition applies, as before, to all cans to pack honey.

Fisher Possibilities Again Discussed In Automobile Circles

Cleveland

• • • **Speculation on the** future of the Fisher Brothers broke into print again this week in a general survey of the automobile industry and special studies of leading automobile and parts manufacturers, released by Merrill, Lynch, Pierce, Fenner & Beane.

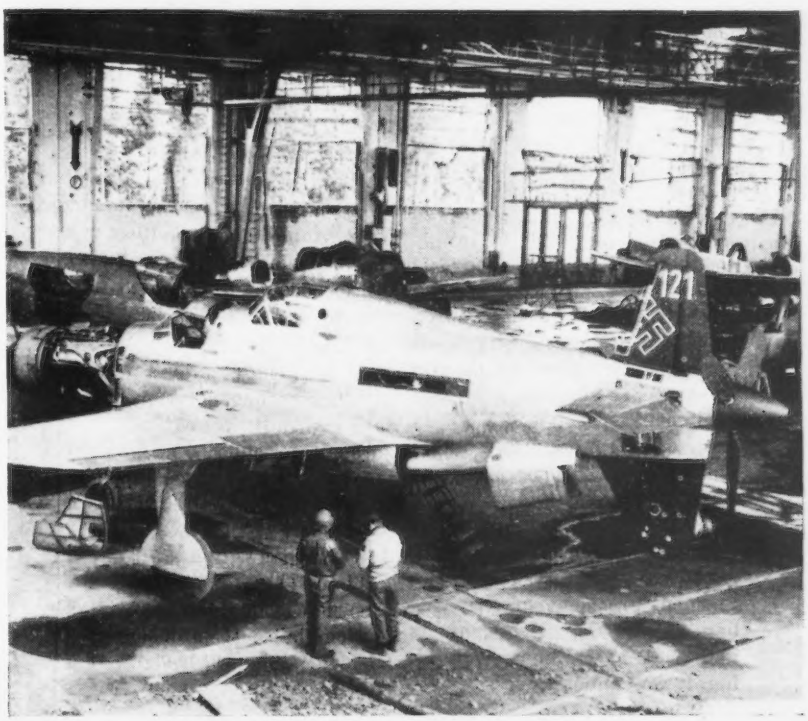
In part, the survey states: "Looming behind the changing automotive scene are the able Fisher Brothers and many an investor, many a manufacturer, would give his eye teeth to know their plans. Should these ex-General Motors men, with their vast fund of experience and cold hard cash, pull a really plump rabbit out of the automotive hat, it might cause many an important change."

"Guesswork concerning the Fishers would be idle. There are as many conjectures about their future as there are about the weather. Naturally, most of these are concerned with the possibility of mergers and range all the way from a complete consolidation of all the independents to separate amalgamations, including accessory organizations as well as car makers. It may well be, however, that mergers with or without the Fisher Brothers, will be deferred until the early postwar period has given concrete proof of what the automotive market actually is going to be."

Henry J. Kaiser's possible plunge into the automotive field was also given cursory examination in the survey. Mr. Kaiser, who has publicly announced that he will produce a "$400 postwar car for America," has been the subject of many a rumor. Experienced automobile men, however, are inclined to feel that such a car is definitely in the realm of wishful thinking.

Now, it is rumored that experiments concentrated upon a light jeep-like vehicle, which Kaiser men consider superior to the jeep itself, are well advanced at the Fleetwings plant in Bristol, Pa. (operated by Henry J. Kaiser). And, as the survey points out, there is, of course, the Aviation Corp.'s Consolidated Vultee, which has received orders for experimental buses, and may have more up its sleeve in this field. Pointing to this is the presence of designer Stout on Consolidated's payroll.

NAZI DORNIER PLANE: *Featuring something new in German aircraft is this brand new twin-engine Dornier* 335 *fighter-bomber with front and rear propellers. The plane, never used against the Allies, had a speed of over* 400 *mph, at* 25,000 *ft. The Dornier assembly and repair plant located* 15 *miles southwest of Munich put out* 200 *motors weekly as well as many planes.*



Industrial Briefs . . .

• NEW FORGE PLANT — Cornell Forge Co., Chicago, will occupy a new plant about Oct. 1 to be constructed at 6666 West 66 Street. The structure will include 43,000 sq. ft. of enclosed space on a site of 88,000 sq. ft. Facilities will be similar to those occupied at present with improved ventilating and fuel storage facilities.

• WINS SAFETY AWARD—South works, Chicago, of Carnegie-Illinois Steel Corp., has won the 32 semi-annual inter-plant accident prevention contest conducted by the Greater Chicago Safety Council. With an average employment of 12,960, the plant worked 16,796,992 manhours with only 34 lost-time accidents, thus establishing a frequency rate of 2.0 per million manhours.

• ARMY CONTRACT — The Rudolph Wurlitzer Co. has leased the second and third floors of the old Ford Motor plant in Main Street, Buffalo, which was recently acquired by Trico Products, and will start production soon after June 1 on Army Ordnance contracts. The nature of the items to be produced was not disclosed.

Vice-President Carl E. Johnson of Wurlitzer, explaining his company's agreement with Trico, said that "eventually the entire Main Street plant will revert to Trico for its own extensive postwar manufacturing program."

• INDUSTRIAL RESEARCH—Processes Research, Inc., Cincinnati, has been organized to conduct research in industrial processes, equipment, design, methods, uses, construction and other phases. The incorporators are Charles Beltzhoover, president of Beltzhoover Electric Co.; Aldon M. Kinney, president of A. M. Kinney Co., and James Coombe, president of the William Powell Co. Headquarters will be at 1211 Enquirer Building, it was announced.

• EXCEPTIONAL SERVICE — Ivan A. Swidlo, chief engineer, Springfield Armory, Mass., has received from the Secretary of War a citation and emblem for exceptional civilian service. Mr. Swidlo is the first one at Springfield Armory to receive such a citation.

• ANTI-TRUST CHARGES — The Anti-Trust Division of the Department of Justice has announced that it has instituted civil proceedings against the Electric Storage Battery Co., alleging certain foreign agreements of long standing are now considered in violation of the anti-trust laws.

• POSTWAR EXPANSION — Anchor Concrete Products, Inc., has purchased a 6½-acre tract in Buffalo's east side industrial area and plans to erect new manufacturing facilities to cost more than $200,000, according to Frederick W. Reinhold. Work on the project will start as soon as government approval can be obtained to use the required materials and manpower. Richard T. Carpenter has been named chief engineer of the concern.

• LIGHT METALS DISPLAY—Edw. S. Christiansen Co. has established a showroom, technical library and office at 831 South Flower Street, Los Angeles. There will be exhibited aluminum and magnesium raw materials, semi and fully fabricated casting and wrought parts as well as finished assemblies representing the products and developments of the countries leading aluminum and magnesium producers, fabricators, foundries, consumers and research organizations.

• JOINS SAE—M. LeRoy Stoner, former chief of standards of General Motors Eastern Aircraft Division, has been appointed staff engineer of the Aeronautics Department of the Society of Automotive Engineers.

Forms Established For Purchasing Of Government Equipment

Washington

• • • **To be used** by contractors in making offers to purchase government-owned equipment in their plants as well as to request the government to remove such equipment, Director of Contract Settlement Robert H. Hinckley has issued Regulation 18 prescribing Office of Contract Settlement Forms 5 and 5-a. Designed to speed removal of sale of the equipment, Director Hinckley said that government agencies can act promptly only if the supporting schedules (Form 5-a) are filled in accurately and completely in accordance with the instructions on the form.

He pointed out that contractors with a facilities contract, lease, or similar arrangement made directly with an owning agency should present their offers to purchase and requests for removal to that agency. Contractors whose facilities contract, lease or similar arrangement is with a facilities contractor should present their offers or requests to that contractor. Separate supporting schedules, the Director stated, should be prepared for the equipment that the contractor wishes to purchase and for the equipment he wishes to have removed from his plant. The owning agency will advise the number of copies of the form to be submitted.

The use of a standard form by all agencies, Director Hinckley explained, will facilitate preparation of offers to purchase and requests for removal by contractors, as well as review of such offers and requests by the government agencies and their facilities contractors. Reproduction of the forms is authorized, he said, provided no change is made in arrangement or size. Copies of the new forms will be available from owning agencies as soon as a sufficient supply can be reproduced and distributed.

Arbitration Ordered

Gary, Ind.

• • • **Arbitration under** existing contract procedures has been ordered by the Sixth Regional War Labor Board in a dispute over a new incentive plan in the continuous pickling department of Gary sheet and tin mill, Carnegie-Illinois Steel Corp. The Board ordered the union to cease slowdown activities if any exist.

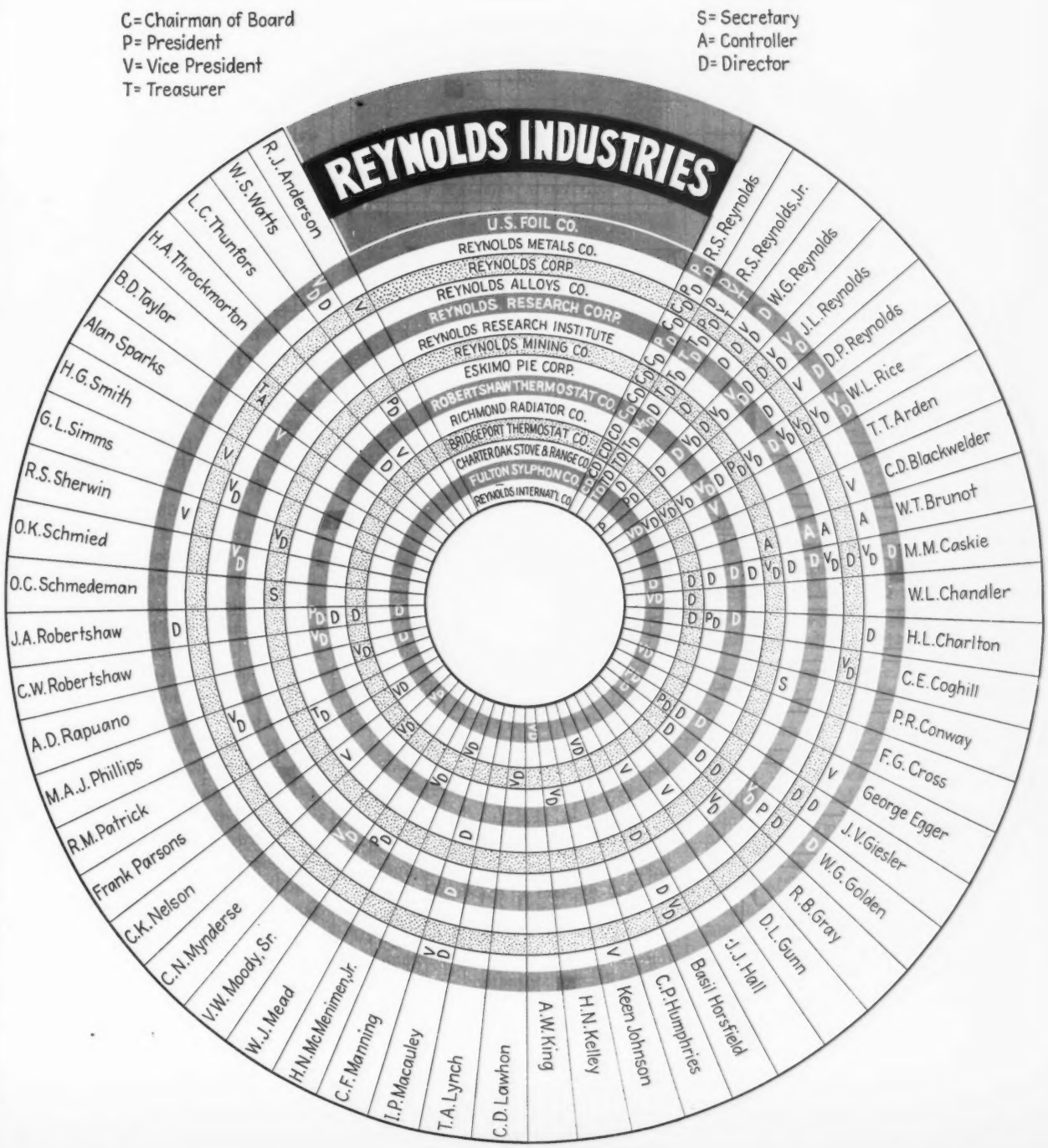
Reynolds Strengthens Position of Organization

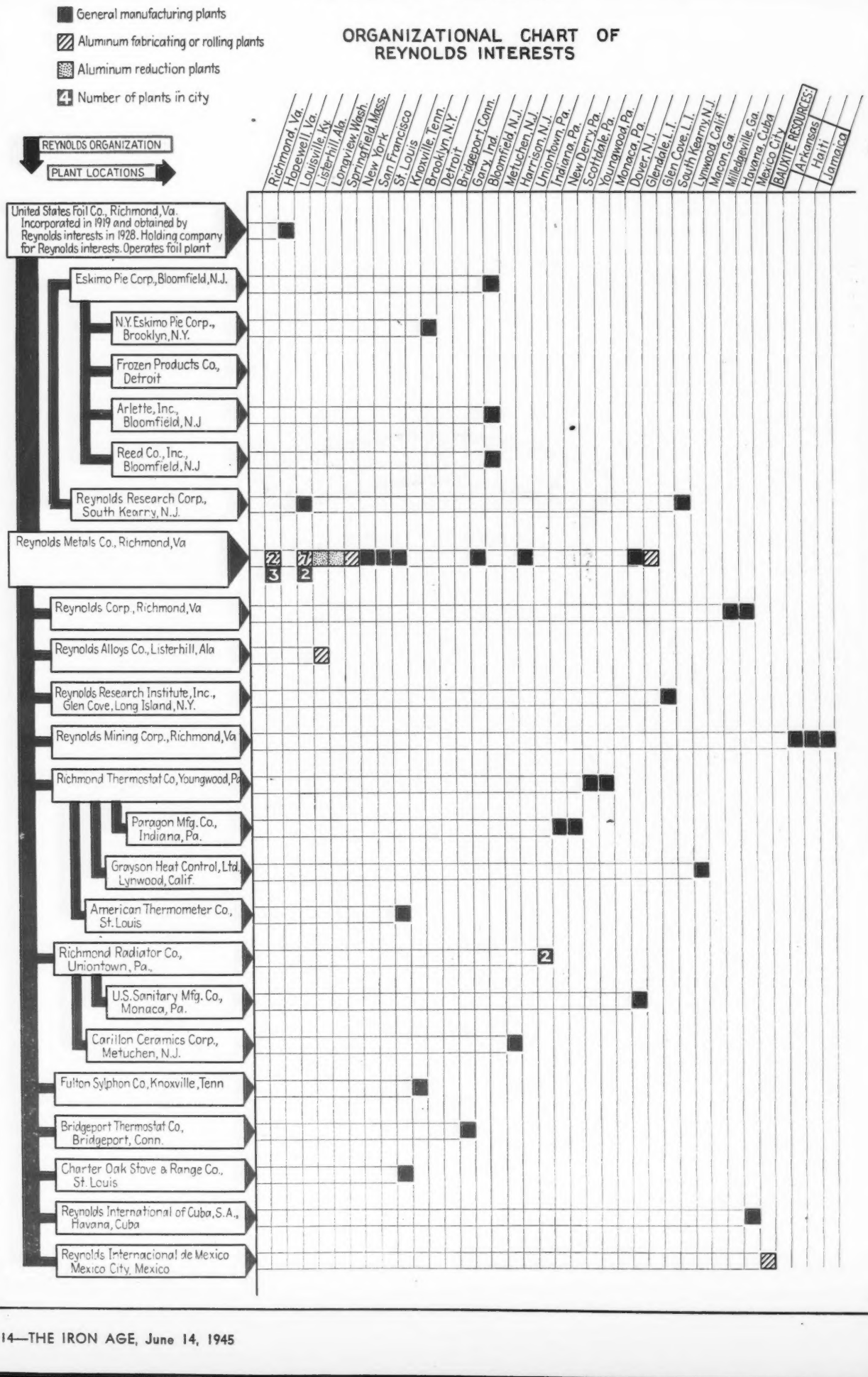
By T. E. LLOYD

Pittsburgh

• • • **The war has** brought several new names to the fore as leaders in industry, probably the outstanding of which are three—Henry J. Kaiser, R. S. Reynolds, and Andrew J. Higgins. The spotlight was brightest on Kaiser when he began to break shipbuilding records. Higgins gained national fame because of his activities in the design and construction of Navy landing craft. However, a real dry-land captain of industry is R. S. Reynolds, who gained his fame by invading the 50-year-old aluminum monopoly, building an organization and plants from nothing, and making them work.

In the face of considerable criticism, scorn by government war materials experts, and at the risk of financial ruin to his rather widespread system of manufacturing plants, in 1939 R. S. Reynolds pointed out to the Government of the United States that the 327,000,000 lb. aluminum capacity of this country was not sufficient to fight an inevitable war. Various warborn materials agencies, as well as Alcoa insisted that this capacity was suf-




General manufacturing plants
Aluminum fabricating or rolling plants
Aluminum reduction plants
4 Number of plants in city
ORGANIZATIONAL CHART OF REYNOLDS INTERESTS
REYNOLDS ORGANIZATION
PLANT LOCATIONS
Richmond, Va.
Hopewell, Va.
Louisville, Ky.
Listerhill, Ala.
Longview, Wash.
Springfield, Mass.
New York
San Francisco
St. Louis
Knoxville, Tenn.
Brooklyn, N.Y.
Detroit
Bridgeport, Conn.
Gary, Ind.
Bloomfield, N.J.
Metuchen, N.J.
Harrison, N.J.
Uniontown, Pa.
Indiana, Pa.
New Derry, Pa.
Scottdale, Pa.
Youngwood, Pa.
Monaca, Pa.
Dover, N.J.
Glendale, L.I.
Glen Cove, L.I.
South Kearny, N.J.
Lynwood, Calif.
Macon, Ga.
Milledgeville, Ga.
Havana, Cuba
Mexico City
BAUXITE RESOURCES:
Arkansas
Haiti
Jamaica
United States Foil Co., Richmond, Va. Incorporated in 1919 and obtained by Reynolds interests in 1928. Holding company for Reynolds interests. Operates foil plant
Eskimo Pie Corp., Bloomfield, N.J.
N.Y. Eskimo Pie Corp., Brooklyn, N.Y.
Frozen Products Co., Detroit
Arlette, Inc., Bloomfield, N.J
Reed Co., Inc., Bloomfield, N.J
Reynolds Research Corp., South Kearny, N.J.
Reynolds Metals Co., Richmond, Va
Reynolds Corp., Richmond, Va
Reynolds Alloys Co., Listerhill, Ala
Reynolds Research Institute, Inc., Glen Cove, Long Island, N.Y.
Reynolds Mining Corp., Richmond, Va
Richmond Thermostat Co, Youngwood, Pa
Paragon Mfg. Co., Indiana, Pa.
Grayson Heat Control, Ltd., Lynwood, Calif.
American Thermometer Co., St. Louis
Richmond Radiator Co., Uniontown, Pa.,
U.S. Sanitary Mfg. Co., Monaca, Pa.
Carillon Ceramics Corp., Metuchen, N.J.
Fulton Sylphon Co., Knoxville, Tenn
Bridgeport Thermostat Co., Bridgeport, Conn.
Charter Oak Stove & Range Co., St. Louis
Reynolds International of Cuba, S.A., Havana, Cuba
Reynolds Internacional de Mexico Mexico City, Mexico

ficiently great; but to show faith in his convictions, Mr. Reynolds mortgaged all his industrial plants to RFC for enough money to build an aluminum plant in Alabama. In the center of the triangle formed by the cities of Sheffield, Tuscumbia and Florence, Reynolds' Listerhill plant produced aluminum ingot on May 18, 1941.

Events of the war proved him a better prophet than his contemporaries because within a year after Listerhill plant got into production, the Aluminum Co. of America, the Defense Plant Corp., and the Olin Mfg. Co. all began intensive aluminum capacity expansion. However, being a first and invading what was heretofore a monopoly, the name of R. S. Reynolds became nationally known practically overnight.

To clear up a general misconception of the scope of Reynolds activities, it is really necessary to examine the entire corporate structure. This structure is graphically shown in the accompanying organizational chart. The aluminum business is the newest of the Reynolds enterprises, but it is by no means the whole picture. Reynolds Metals Co., and its 23 affiliates and subsidiaries, own and operate more than 50 active plants, mines, and laboratories in 16 states as well as in Haiti, Jamaica, Cuba, and Mexico. During the four-year period ended Dec. 31, 1944, gross billings for war contracts, which represent the bulk of the business for this period, exceeded $600,000,000. These billings were for a wide variety of products going into a vast number of machines of war and production.

Prior to the war, Reynolds Metals Co. was the world's largest producer of lead and aluminum foil. In 1941 it went into the business of producing aluminum in a plant built at Listerhill, Ala. Since then, through Reynolds Mining Corp., a subsidiary, mining property has been acquired in Arkansas, Haiti, and Jamaica. Reynolds Metals Co., and Reynolds Alloys Co., the latter a wholly owned subsidiary, are now substantial producers of aluminum ingots, sheets, rods, bars, shapes, extrusions, forgings, and castings. The parent company also prefabricates aluminum and manufactures aluminum foil, powder, and paste. In addition to the aluminum reduction plant at Listerhill, the company operates an RFC-owned plant at Longview, Wash., where alumina is reduced to aluminum. Reynolds Corp., another Reynolds Metals Co. subsidiary, operates two Naval Ordnance plants, one at Macon, Ga., and the other at Milledgeville, Ga.

PRESIDENT: *R. S. Reynolds, president of Reynolds Metal Co.*

VICE-PRESIDENTS: *William G. Reynolds, left vice-president of Reynolds Metals Co., is active in operations at both Listerhill, Ala., and at Louisville, Ky. David P. Reynolds, right, also a vice-president of Reynolds Metals, directs part of the operations at Louisville.*

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Reynolds Metals Co. was incorporated in Delaware in 1928. It acquired the business and operating assets of United States Foil Co., which was organized in 1919. U. S. Foil Co., now a holding company for Reynolds Metals, owns about 53 per cent of its common and 53 per cent of its preferred stock. The U. S. Foil Co. is also an operating company, with a repackaging plant that has been operating at Hopewell, Va., as a Naval depot since the start of the war.

United States Foil Co. also owns more than a third of the preferred and more than 30 per cent of the common stock of Arlette, Inc., Bloomfield, N. J., manufacturers of permanent hair-waving supplies. More than half of the common capital stock of Reynolds Research Corp., South Kearny, N. J., and Louisville, Ky., is held by the U. S. Foil Co. Reynolds Research Corp.'s plants are currently engaged in the production of containers for shell cases and powder, and in the coating of packaging material.

Another affiliate of the organization is the Eskimo Pie Corp., Bloomfield, N. J., which in turn owns the now-inactive New York Eskimo Pie Corp., Brooklyn, N. Y., the Frozen Products Co., Detroit, and the Reed Co., Inc., Bloomfield, N. J., a patented machinery rental outfit. United States Foil Co. owns and controls almost all of the former company's Class A and Class B common stock. The Eskimo Pie Corp. is primarily engaged in the business of licensing ice cream manufacturers to make and sell frozen food products.

The Reynolds Metals Co. has several other subsidiaries most of which are wholly owned. Robertshaw Thermostat Co., with plants in Youngwood and Scottdale, Pa., which in turn owns Grayson Heat Control, Ltd., Lynwood, Calif., American Thermometer Co., St. Louis, and Paragon Mfg. Co., Indiana, Pa., and New Derry, Pa., is a Reynolds Metals Co. subsidiary. Other subsidiaries include Fulton Sylphon Co., Knoxville, Tenn.; Bridgeport Thermostat Co., Inc., Bridgeport, Conn.; Reynolds International of Cuba, S. A., Havana, Cuba; Reynolds Research Institute, Inc., Glen Cove, L. I.; and Charter Oak Stove and Range Co., St. Louis. The Richmond Radiator Co., with two plants in Uniontown, Pa., is also a subsidiary, but the voting power held by Reynolds is less than 100 per cent. Richmond Radiator in turn owns the United States Sanitary Mfg. Co., Monaca, Pa. Very recently Richmond Radiator purchased the sanitaryware plant of General Ceramics Co., at Metuchen, N. J., which will be operated under the name of Carillon Ceramics Corp.

Basic production of aluminum at Listerhill is under the direction of Basil Horsfield, vice-president of Reynolds Metals Co., who, about 10 years prior to joining the Reynolds organization, had been employed by the Aluminum Co. of America. At the Longview, Wash., plant, E. J. Appel,

assistant vice-president and plant manager, directs production activities. At Listerhill, the present rated capacity is 100,000,000 lb. of aluminum per year. Also at Listerhill, Reynolds Alloys Co. operates a plant for the production of alloy rods, bars, and sheets, with a rated capacity of about 275,000,000 lb. of aluminum products per year. The operations of the Reynolds Alloys Co. are under the direction of M. A. J. Phillips, vice-president, also an ex-Alcoa man. Longview aluminum producing capacity is rated at 60,000,000 lb. per year.

In Louisville, Ky., nine plants, a shipping terminal, and a machinery warehouse are operated by Reynolds Metals Co. Two plants prefabricate aircraft parts. The other plants produce forgings, extrusions, rods, sheets, foil, powder and paste, and reclaim aluminum scrap. Foil operations are mainly located at Richmond, Va. Reynolds rolls aluminum and lead foil in two plants, prints on foil with rotogravure presses in one plant, makes packages of foil in one plant, and maintains an experimental paper laboratory and makes an anti-radar device for the Air Force in the fifth Richmond plant. A new foundry was recently obtained by Reynolds Metals Co. at Springfield, Mass., where parts are made for airplane engines, gun turrets and robot bombs. This plant is under the direction of T. A. Lynch, vice-president, and is reputed to be one of the most modern aluminum foundries in the country.

Reynolds Metals Co. also operates plants in the following localities: Glendale, L. I., foil rolling and scrap reclamation; Harrison, N. J., war packaging and gravure printing on foil; New York, cartons and containers; San Francisco, printing; St. Louis, printing; Gary, Ind., film coating of wrappers; and Dover, N. J., a machinery warehouse.

Robertshaw Thermostat Co., Youngwood and Scottdale, Pa., produces thermometers, actuators, and thermostats. American Thermometer, St. Louis, makes thermometers. Paragon Mfg. Co., New Derry and Indiana, Pa., produces hand grenade fuses. Fulton Sylphon Co. makes metal bellows, thermostats, valves, and heat control equipment at Knoxville, and Bridgeport Thermostat Co. manufactures heat control instruments at Bridgeport.

While now inactive, U. S. Sanitary Mfg. Co. will make plumbing supplies and enamelware after the war, and Richmond Radiator Co. produces in its two Uniontown, Pa., plants various ordnance equipment of a restricted nature, enamelware fixtures, air conditioning units, boilers and ducts. War contracts for Richmond are about completed, and reconversion is underway. Grayson Heat Control, Ltd., Lynwood, Calif., manufactures aircraft parts and heat control equipment, and is under the direction of T. T. Arden. Charter Oak Stove & Range Co., St. Louis, directed by J. Louis Reynolds, makes stoves, field kitchens, tank assemblies and insulation.

Reynolds Corp.'s plants at Macon and Milledgeville, Ga., are fuse loading and fuse parts plants, respectively. Reynolds International of Cuba, S. A., has a label and wrapper printing plant at Havana, Cuba. While Reynolds Mining Corp. has engaged in mining operations in Arkansas, it holds concessions in Haiti and Jamaica, reported to be very extensive. This subsidiary is headed by Walter L. Rice, who is also vice-president of Reynolds Metals Co., and other affiliated companies, and general counsel to all companies in the Reynolds organization. Reynolds Research Corp. has a coating plant at South Kearny, N. J., and a container manufacturing plant at Louisville, Ky. Reynolds Research Institute, Inc., is under the direction of Dr. Warren J. Mead, formerly head of the Geology Department of the Massachusetts Institute of Technology and formerly a consultant for many industrial corporations including American Smelting & Refining Co., and Aluminum Co. of America. He has administrative offices and laboratories at Glen Cove, L. I., and the company is purely a product research organization.

So much for the extensiveness of the corporate setup of the Reynolds organization. Needless to say, while the aluminum end of the Reynolds enterprises is vitally important, it is a newcomer to Reynolds and the company could well have survived without it. On the aluminum end, R. S. Reynolds hangs his hopes, as do his four sons who are all active in the organization. Most of the management control of the organization is vested in R. S. Reynolds and a few key executives, including his sons: R. S., Jr.; J. Louis; David P.; and William G., some of whom are officers and directors of all the companies, as shown in the accompanying illustration.

When R. S. Reynolds proposed building an aluminum reduction plant, his first task was to find men who could do the job. Since aluminum production had been a monopoly, he had only one source to draw upon, and that was the Aluminum Co. of America. From Alcoa, he got many key production men, and largely through their efforts the aluminum end of the Reynolds business is thriving today. From a capacity standpoint, Reynolds isn't in the same league as Alcoa, because Alcoa's capacity is 828,127,000 lb. per year owned outright plus 1,293,424,000 lb. per year that is DPC-owned and Alcoa-operated. On the other hand, Reynolds-owned capacity is just 100,000,000 lb. per year, plus the 60,000,000 lb. per year produced at the RFC plant at Longview. On this basis, Alcoa's capacity is about 13 times greater than that of Reynolds. Less than 25 per cent of the DPC-owned, Alcoa-operated plants that make up these capacities are now in actual operation.

Foremost in the minds of both the Aluminum Co. of America's and Reynolds' executives is the disposition of the DPC-owned aluminum plants. Long standing anti-trust actions against Alcoa would seem to be a barrier in the way of the company getting much of plant capacity from DPC. From a practical standpoint, it seems now more obvious that events will favor Reynolds. In Reynolds' favor, should it really want to acquire much of the DPC-owned aluminum capacity, is the recent ruling of the Supreme Court that held Alcoa to be a monopoly before the war. The court ruled that the extent of Alcoa's dissolution, if any, should await disposition of the Defense Plant Corp.-owned aluminum capacity. It would, therefore, seem pretty unlikely that Alcoa will be able to retain much of this capacity. However, anything said now about DPC plant disposals is pure speculation.

The Reynolds organization never sells Alcoa short. Every member realizes that the company is faced with the keenest kind of competition from the standpoints of product development, research, production technique, sales, and management. However, an outsider's first impression of the Reynolds' setup is that it is a young man's company with youth's enthusiasm. Youth is not only evident in the working and sales forces of the organization, but also in the

management. Many young men today are getting what they feel is a break with Reynolds, whereas until Reynolds came they felt they were butting their heads against the stone walls of the precedents, age, and the conservation of old line organizations that never recognized their capabilities and the possibilities of the injection of youth into management.

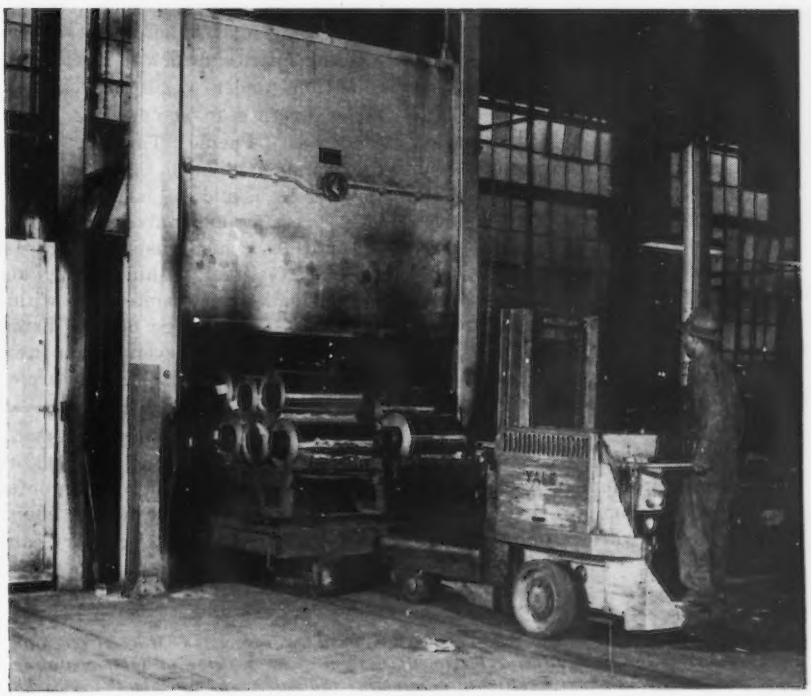
With such enthusiasm, there is bound to be considerable over-optimism, but perhaps this can be overlooked. R. S. Reynolds himself, as evidenced in his testimony before the Senate Small Business Committee in February, sounded grossly over-optimistic. His postwar aluminum consumption figures in the railroad, automotive, truck and bus, and construction fields seem to be a little on the "blue-sky" side. He estimated that the automotive industry would use a minimum of 400,000,000 lb. per year; the truck and bus industry about 120,000,000 lb. per year; railroads in carbuilding about 1,000,000,000 lb. per year; and the construction industry would use "hundreds of millions of pounds" per year. Other investigators in these fields do not approach the consumption figures of Mr. Reynolds.

The diversity of the products of the various Reynolds subsidiaries, however, give this outfit a rather interesting potential. It serves both the industrial and the consumer markets. The foil, packaging, foil printing, decorative coverings, seals, advertising displays, and other such products, making use of a special patented multi-color printing process gives the company a wide outlet for its foil products. Furthermore, its frozen confection line is a direct consumer product. On the other hand, heat controls, thermostats, thermometers, plumbing supplies, enamelware, stoves, and the many other products of the company serve both industrial and consumer markets. As has happened in the past, one phase of the business can carry another phase through its difficulties without fear of financial ruin.

One interesting bit of development the company is now working on is in the application of aluiminum coatings to wood and steel. Reynolds has already developed a process of applying thin sheets of aluminum to both sides of plywood in such a manner that it is practically impossible to remove the metal without completely destroying the wood inside. This has a huge potential in the construction field because it is a rigid and strong surfacing material that has exceedingly fine insulating characteristics. The interesting phase of this product is that it will utilize scrap aluminum rather than virgin ingot. In the words of R. S. Reynolds, this product, Reynalite, will "house war veterans with the scraps of war."

In coating steel with aluminum, Mr. Reynolds said recently that his laboratories had developed two practical methods. American Rolling Mill Co. is already marketing an aluminum clad sheet that is called "Aluminized Sheet," but the Reynolds products probably will not be marketed until after the war.

The Reynolds labor policies have been good straight through the war, as evidenced by the fact that there has never been a union-authorized strike in any of the plants. The policy has been to lean over backward to satisfy the demands of organized labor, but, at the same time, make certain that labor realized that the company had its interest in mind in any action taken. For example, Reynolds for about three years has been working on a new schedule of pay for plant employees that is presently being put into operation. Whereas sifications, all of which were scheduel at 62c. an hr., for beginners and took 24 months to reach top rates of about $1.00 an hr., the new schedule has 14 classifications which schedules starters at 62 to 85c. an hr., depending upon the classification, and requires only about 11 months to reach the top wage rate which goes as high as $1.05 an hr. Furthermore, on reaching the top rate in any classification, a worker now can apply for transfer to another classification, and eventually reach the $1.05 an hr. rate.



FURNACE CHARGING: *Charging an annealing furnace with coils of aluminum foil at Reynolds Metals Co.'s foil plant at Louisville, Ky.*

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Reynolds is in the aluminum business to stay. That much is certain. Too much has been invested in it to pull out now, and the only course is forward. Mining concessions obtained in Haiti and Jamaica are, according to Mr. Reynolds, sufficient to carry the company at its present capacity for many, many years. That type of forward planning forbids any thought of getting out of the aluminum business. Reynolds Metals Co. has driven the opening wedge into a tightly closed industry, and time will witness the entry of others into the field.

Reports Experiences With Synthetic Tires And Motor Vehicles

Detroit

• • • **Military experts**, sent to various war theaters to ascertain how American-made motor vehicles and synthetic tires are meeting the supreme tests of war, rendered a favorable report before the SAE Detroit Section War Materiel Meeting in Hotel Book-Cadillac here recently.

The meeting, one of a series of local war emergency conferences sponsored by the Society of Automotive Engineers to facilitate the dissemination of war-engineering information, was told that the vitally important 6.00-16, 7.50-20, and 9.00-16 synthetic tires have proved themselves to be completely adequate in the western European and Italian theaters of war, Major J. J. Robson, of Office, Chief of Ordnance, Detroit, reported that the larger sizes of synthetic tires still need improvements to prevent failures from overloading, high speeds, and long-distance travel.

Worst war problem involving tires, said Major Robson, is tire damage from an endless variety of the debris of war. Worst aspect of this worst problem, he added, is that it causes the loss of thousands of tires, yet nothing can be done about it.

"Synthetic rubber has generally done a very successful job in its great test in combat," he commented, adding that the rubber industry aggressively is attacking the problem of improving the larger tires and of meeting the needs for offsetting unavoidable overloading and abuse of equipment.

From Maj. A. E. Cleveland, also of Office, Chief of Ordnance, Detroit, the meeting heard a dramatic story of the conditions under which tires and vehicles operate in some parts of the Southwest Pacific Theater. Major Cleveland explained that conditions vary from island to island, but the most pressing and universal problem is corrosion, which rusts through 14-gage sheet steel within 24 hr. and causes leather to disintegrate within days, glass to undergo optical distortion, and wood and even human flesh to rot quickly unless given proper care.

Major engineering needs of motor vehicles, Major Cleveland reported, include waterproofed and mudproofed brakes; permanent type fording equipment; improved cross-country and mud-travel ability; and methods of quickly attaching pontons, to be inflated by exhaust gases and used in getting light vehicles across wide rivers. Daily extraction of the most powerful motor vehicles from mud and brake servicing every 300 miles are jobs which defy human ingenuity, he said.

Major Cleveland revealed that military police restrict motor vehicle loads to normal capacities and speeds to 15 to 20 miles an hr. on improved roads, while nature does the policing on the unimproved, which may be woodland trails or beds of streams. Tactical roads seldom have bridges, he said, and 17 stream crossings may be made in six miles. In view of these conditions, traction and flotation was held to be an engineering problem second in importance only to corrosion.

American-made military transport vehicles rendered excellent service in the North African and European Theaters, according to Lt. Col. E. H. Holtzkemper, also of Office, Chief of Ordnance, Detroit. He said that in September alone, with transports constantly bringing additional vehicles, approximately 210,000 motor trucks, 99,000 trailers, 7600 semi-trailers, 4000 motorcycles, and 550 passenger cars were operating in France, Belgium, and the outer fringes of Germany. Vehicles estimated to last two years, or 24,000 miles, were in operation after three years and 60,000 miles, he reported.

Describing the nature of transport vehicle operations, Colonel Holtzkemper said that two and one-half ton trucks were carrying loads up to nine and three-quarter tons, and that front-wheel drives were found in the field to be essential.

Personnel of all ranks in all arms and services complain of the variety of sizes, makes, and models of vehicles, Colonel Holtzemper said, adding that the variety complicates problems of procurement, supply, maintenance, and training. He characterized as the "No. 1 peacetime job" of automotive industry and Army the solution of the problem of vehicle varieties.

Other vehicle engineering problems requiring solution were said to include: improved riding-comfort; less fatiguing operation; protective cabs; stronger bodies; elimination of operating noises, such as brake squeal; more rugged transmissions and transfer cases; and improvement of brakes.

THE BATTLE IS OVER TEMPORARILY: *Two exhausted Marine machine gunners of the Fifth Marine Regiment sleep in their position on Okinawa after three days continuous fighting in eliminating the Japanese forces in the Awacha pocket.*

Lack of Information Is Called Foremen's Greatest Grievance

New York

• • • **Top management's failure** to tell foremen where they stand, rather than specific grievances about pay or working conditions, is largely responsible for the current widespread interest in unionization among supervisory staffs, a study just issued by the American Management Association indicates. While the foremen's authority has been considerably curtailed in recent years, the study notes, this curtailment is due less to the desires of top management than to the increase in government regulation, the rise of rank-and-file unions, and the development of specialized knowledge which necessitates greater use of staff departments — and the reduction in authority is not peculiar to the foreman but general throughout management.

The report, "The Development of Foremen in Management" is based on a questionnaire survey of representative manufacturing companies, consultations with executives and foremen, and exhaustive study of the published material on the subject, including the transcript of the NWLB panel hearings dealing with the grievances put forth by foremen's unions. Data from the 100 companies covered in the survey highlight the change in supervisory responsibilities:

Hiring. In one-third of the companies, the foreman has no voice in hiring at all; in the other two-thirds, he has the right of final acceptance or rejection of new employees, but the personnel department has charge of selection procedures.

Discharge. In only one-tenth of the companies may foremen discharge their subordinates without consultation with superiors or the personnel department.

Pay Increases. In almost every case, these must be approved by other authorities.

Discipline. In only one-tenth of all cases do foremen have complete charge of discipline.

Grievances. Discussion with the foremen is generally the first step in the grievance procedure, but the extent to which he settles grievances is not clear. A small sampling in the automotive - aircraft industries shows that this may range from 45 to 80 per cent.

Fear of union charges of "discrimination" in discharges or discipline cases, for instance, has led companies to turn these matters over to specialists who can keep abreast of government rulings and contract interpretations; the growth of scientific selection procedures has impelled them to delegate hiring to personnel departments.

In too many instances, however, the study points out, firms have failed to make clear this reasoning to the foremen, or to define the resulting interrelationships. Thus the foreman often does not know the extent of his authority and is afraid to act even on points over which he has jurisdiction.

Firms which have been most successful in coping with this problem, it is shown, have been those which have defined the foremen's authority and responsibility clearly, and have given their supervisors sufficient training to cope with problems which arise on the job.

One of the problems of the supervisory staffs, the study finds, grows out of the mere bigness of some of the plants—foremen find it almost impossible to communicate their grievances to top management, even though an "open door" policy is nominally in effect.

In large plants, also, it is often difficult for top management to get information to the foremen before it has become a matter of common knowledge through the "grapevine." Information meetings, bulletins, and even telephone calls are sometimes used to insure that the foreman will be the first to know of decisions, and gain prestige through being the first to announce them to his men. It is particularly important, the report stresses, that a foreman be informed of the final ruling in a grievance case, before the "aggrieved employee" or the union steward brings him the news.

The study finds little evidence to support the view that foremen, in general, are underpaid; pay actually seems to be highest in some of the industries in which organization has proceeded furthest. In some of the companies appearing before the NWLB panel on foremen's grievances, for instance, annual earnings ranged from $3,300 to $7,800, with the median at about $4,800. In the AMA survey the average pay of "general foremen" ranged from $4,200 to $4,800 a year; "foremen in charge of highly skilled operations" earned from $2,750 to $4,700; "foremen in charge of semi-skilled operations," from $2,700 to $3,900; and "shift foremen" from $2,500 to $3,000. The AMA figures, however, exclude overtime, which was included in the figures given at the panel hearing.

STANDING AMID RUINS: *St. Paul's Cathedral in London, in the center of the picture, is surrounded by whole blocks of razed and damaged buildings, the results of German rocket and bomber attacks.*

Navy Department Reports on Success Of Steel Shell Case

Washington

• • • **Pointing to their** continued use, the Navy Department recently issued a statement outlining three years' successful use of steel cases.

In the spring of 1942, when a critical shortage of copper threatened the output of brass cartridge cases, the Navy said:

"Metallurgists of the Bureau of Ordnance, working with the industry, proved that steel could be substituted for the traditional brass cartridge cases.

"The steel case represents a positive solution of the problem of 'seasem cracking,' the tendency of brass to break down under certain conditions of stress and corrosion," the Navy statement said. "There is no longer any question that the continued use of the steel case will reflect a considerable financial saving to the government due to the differential in price between the raw materials. Perhaps the most significant aspect of the development is the fact that, since the elastic properties of steel cases can be made superior to those of the best brass cases, new possibilities are opened up in the design of more powerful and effective guns."

Metallurgists in the Bureau of Ordnance, forseeing the copper shortage, had been struggling with the problem for some time and, when the situation became acute, had the answer already worked out. By properly treating steel, they succeeded in drastically modifying its elastic properties, making it functionally equal to and even superior to brass.

This meant that steel, as well as brass cases, could be made to have elastic recovery superior to that of the gun itself, so that, after firing, they would return to a size permitting their ready ejection from the gun.

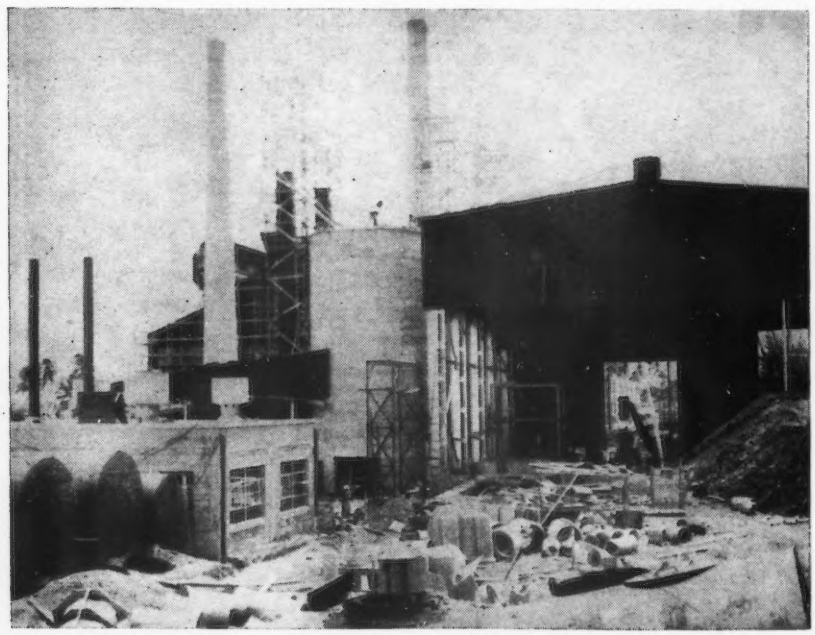
Two months after active developmental work started, successful tests of 20 mm. cartridge cases were conducted at the Naval Proving Ground, Dahlgren, Va., about July 1, 1942. Of the four calibers in which the metal tonnage demands are particularly heavy, three—the 20 mm., 40 mm., and 3-in. 50 cal.—are, and have been since early 1943, in large scale production and use. Steel cartridge cases for the 5-in. 38 cal. have also been developed.

Those for 40 mm., presenting the most difficult problems because of the design of the gun, went into production the latter part of November 1942, about the time the "fighting forties" were beginning to make their sting felt in enemy aircraft downed and United States ships saved. Anti-aircraft firepower, without which United States forces could not have taken the offensive in the Pacific, depended on steady shipments of enormous quantities of ammunition for the forties, the twenties and the three-inch. Had manufacture of cartridge cases out of steel proved impossible, production to maintain these shipments would have been seriously jeopardized.

While partial conversion to steel for cartridge cases was clearing the way for continuing ample ammunition supplies to the fleet, anti-submarine measures were opening up the sea lanes in the South Atlantic and Caribbean. Copper was coming through again. This, together with the fact that high prices had increased productive capacity in this country, alleviated the situation somewhat, so that total conversion from brass cartridge cases never has been completed.

In addition to the major difficulty of securing ease of ejection, there were minor problems to be solved before the steel cartridge case would be practicable for Navy use. Among these were the elimination of the sparing hazard and the problem of salt water corrosion, against which a special surface treatment was developed.

INDUSTRIALIZATION: ***Puerto Rico, a country long devoted to agriculture, now has embarked on a program of building new industries, such as glass, cement, paperboard and ceramics manufacturing. Here is pictured the raw materials preparation building of the Puerto Rico Glass Corp. under construction at Guaynabo.***



Harvester Building Plans Are Announced

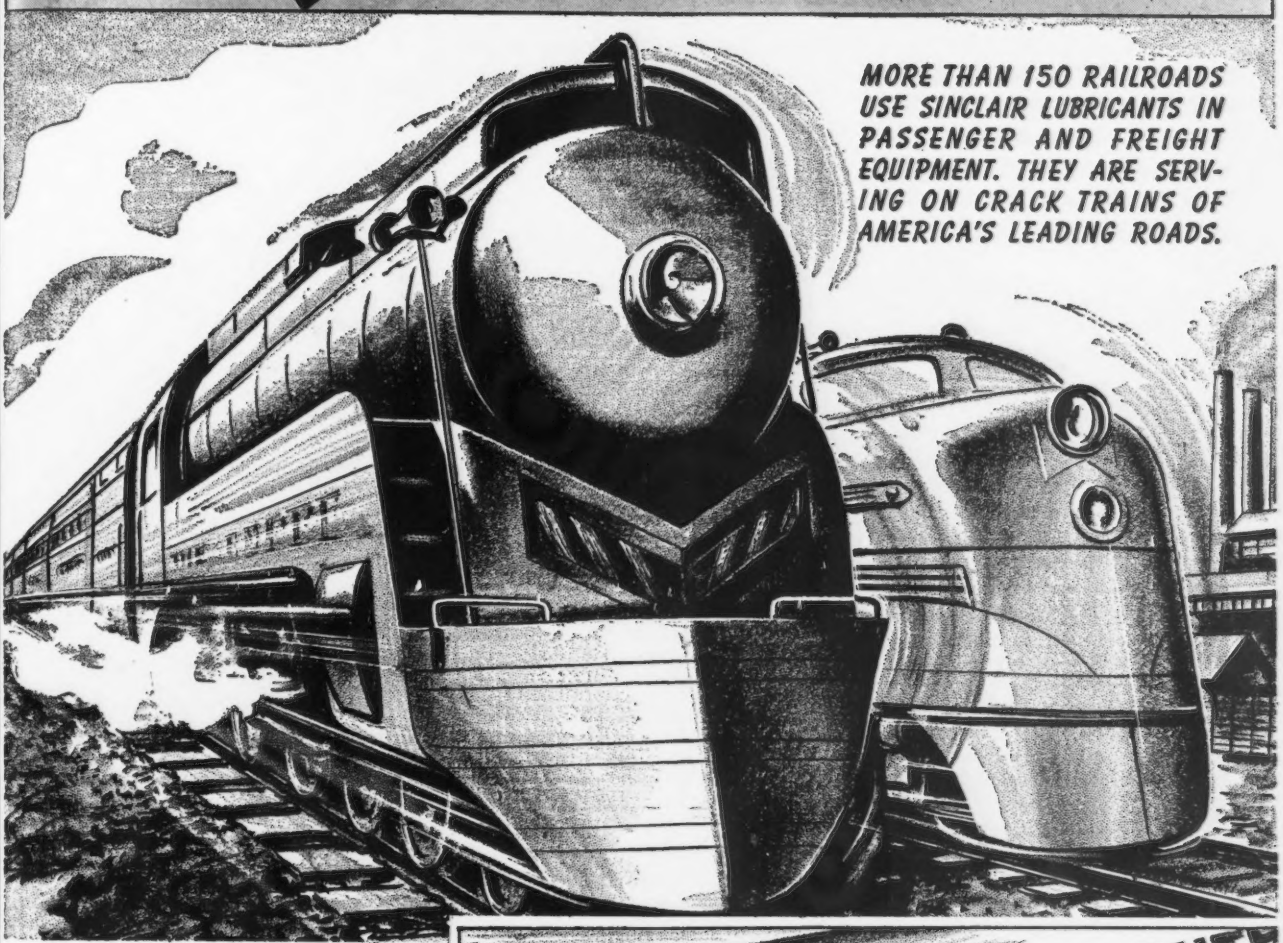
Chicago

• • • **Previously announced** intentions of International Harvester Co. to construct factory facilities at Memphis, Tenn., and on the Mississippi River between Alton and Wood River, Ill., were confirmed recently at the annual stockholders meeting by Fowler McCormick, president.

Construction will begin on these plants as soon as restrictions are lifted, Mr. McCormick said. The Mississippi River farm tractor plant, according to trade reports, will allow the company to expand its line of small tractors. The Memphis plant for implement manufacture, will be the seat of cotton picker production.

Mr. McCormick stated that reports on the company's foreign operations showed the plant of the French subsidiary company at Croix to be in good condition, but inoperative because of coal and transportation shortages. The properties of the German subsidiary, located at Neuss on the west bank of the Rhine suffered severe damage.

Do you know that . . .



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CMP Regulation No. 1 Amended to Provide B Product Easement

Washington

• • • **Further liberalization** of CMP regulations was effected by WPB recently through amendments to CMP Regulation 1 and revocation of Direction 4 to CMP Regulation 9-A.

CMP Regulation 1 was amended to provide that a manufacturer may exceed an authorized production schedule for a Class B product in a case where he has obtained the material for another purpose and it can no longer be used for that purpose.

The amended regulation continues the provision for filling a deficiency in a production schedule to the extent that a deficiency not exceeding 10 per cent in an authorized production schedule for a Class B product during the first quarter of 1945 may be made up in the second calendar quarter of 1945.

All Restrictions Off Domestic Silver Use

Washington

• • • **All controls on the use** of domestic silver have been lifted by amendment of Conservation Order M-199, the WPB has announced. However, restrictions on the use of foreign silver continue in effect. All persons may now make use of domestic silver without restriction to quotas. However the supply of semi-fabricated silver, particularly in wire and sheet form, is very tight and persons desiring to purchase silver may have difficulty in obtaining the metal for some time.

CMP Allotments Are Explained for Quarter

Washington

• • • **Allotments of** controlled materials to non-military claimant agencies for the third quarter of 1945 carry with them no advance allotment authority greater than that already outstanding for the fourth quarter, Lincoln Gordon, program vice chairman and chairman of the WPB Requirements Committee said recently.

Mr. Gordon explained this to mean that while the controlled materials authorizations already issued for deliveries in the fourth and subsequent quarters are not being withdrawn, WPB will not issue any additional "tickets" to non-military claimant agencies for deliveries after Sept. 30, 1945, except in unusual circumstances.

The reason for this action is that WPB hopes to put as much fourth quarter production as possible on an unrated basis and is therefore keeping fourth quarter commitments to a minimum, pending final decision as to how much production must continue to be programmed after Sept. 30, Mr. Gordon said.

To Continue Control Of Melting Schedules To Conserve Alloys

Washington

• • • **A prevailing scarcity** of alloy metals will necessitate the continuation of present metallurgical practices (control of melting schedules to conserve alloy) in filling non-rated orders, WPB officials told a meeting of the Steel Operations and Metallurgical Industry Advisory Committee recently.

To maintain supplies of nickel, Steel Division officials said that nickel oxides must still be used. The low carbon ferro-chrome situation may improve during the third quarter but chrome metal, vanadium, cobalt and tungsten supplies will remain at about the same level, Steel Division officials said.

Latest WPB Regulation Eases Farm Machinery

Washington

• • • **Issued recently** by WPB, Direction 7 to L-257 eases quota restrictions in June on the production of farm machinery. All such restrictions on the industry under L-25-c will be removed on July 1.

As the result of WPB's action, any producer who has no quota or who has completed his quota, whether under Schedule B of L-257 or an Applicable Export Schedule of L-257-a, may make and ship additional quantities of that item before July 1, without regard to his quota. This means that the quota percentages in the schedules and the provisions in the order relating to quotas are no longer effective. Producers may use material now in inventory or material procured without the use of allotments or priority assistance. If priority assistance is needed the producer must apply on CMP-4-b or other applicable forms.

AGMA Election Names P. W. Christensen And Thomas J. Bannan

Pittsburgh

• • • **With war controls** on transportation complied with, the American Gear Manufacturers Association meeting at Hot Springs, Va., recently consumed most of its time by taking up the work of various committees. The gathering was limited to officers and committee members, the attendance having been below 50 in accordance with ODT's request.

P. W. Christensen

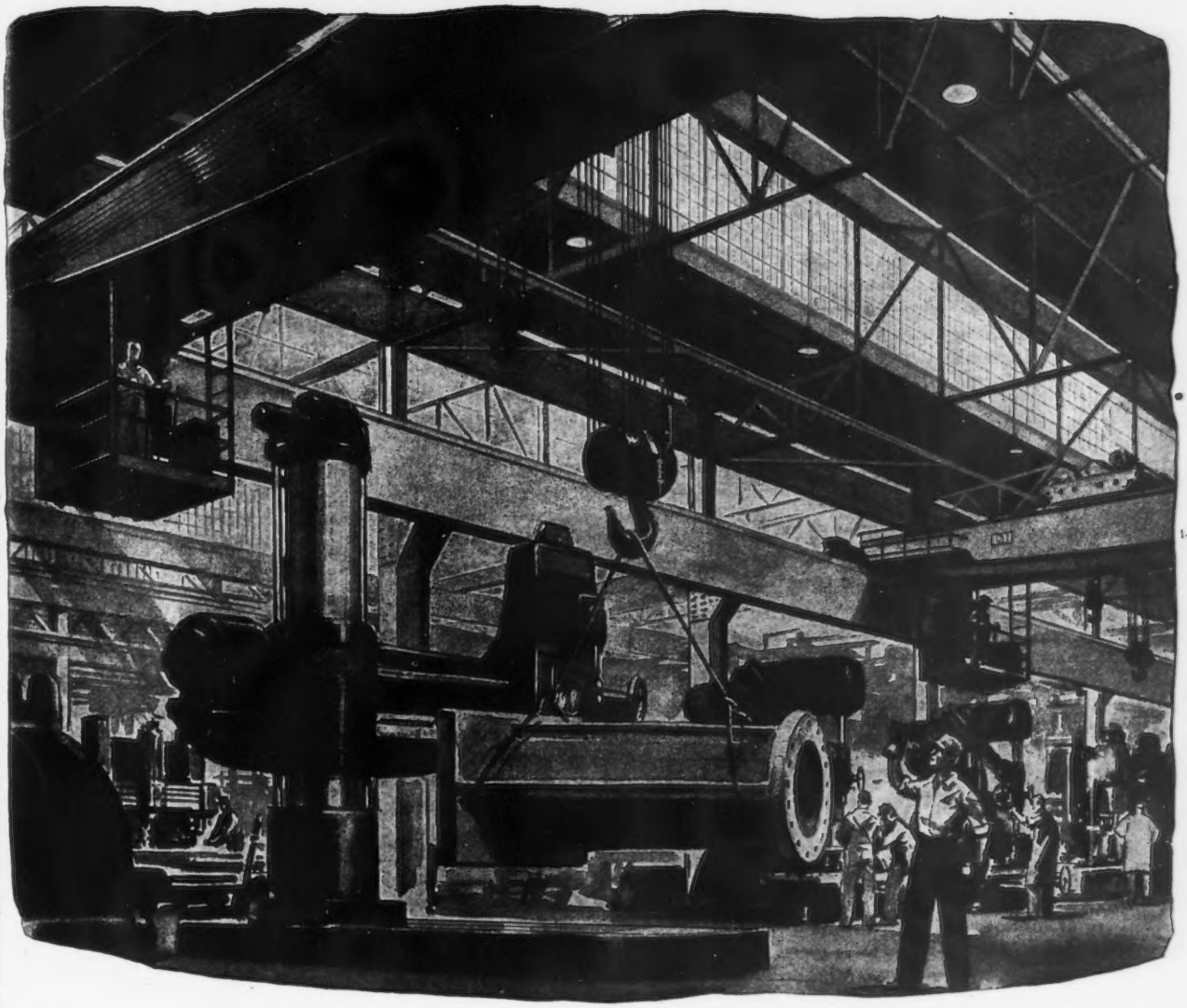
At this "special" 29th annual meeting, the following officers were elected for the fiscal year 1945-1946: President, Paul W. Christensen, president of Cincinnati Gear Co., Cincinnati; vice-president, Thos. J. Bannan, president of Western Gear Works, Seattle; treasurer, Raymond B. Tripp, vice-president of Ohio Forge & Machine Corp., Cleveland; and Newbold C. Goin was re-elected executive secretary.

T. J. Bannan

R. B. Tripp

The following new members were elected to the Executive Committee for three-year terms: Howard Dingle, president of the Cleveland Worm & Gear Co., Cleveland; Elmer H. Johnson, co-partner of Gear Specialties, Chicago; Joseph R. Mahan, director of engineering of the National Supply Co.; Ernest N. Twogood, engineer, Gear Division of General Electric Co., West Lynn, Mass.

Mr. Goin told the members of the association that added personnel had made material on standards and other data more readily available than ever before from the association's headquarters here.



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Another Large Cut Due on Contracts In Next Few Weeks

Washington

• • • **With cutbacks of $7,000,000,000** already made from the peak 1945 munitions program and corresponding cuts for 1946 also ordered, WPB Chairman Krug in his recent report on production states that another large step-down will be ordered within a few weeks with further small adjustments in succeeding months.

Pointing out that reconversion planning attempts to match release of controls to the actual expected release of resources rather than on the present, partially adjusted munitions programs, the belief is expressed that reconversion can proceed rapidly once drawbacks are out of the way.

Acute shortages for some time ahead will not be in basic metals—steel, copper and aluminum — but rather in soft goods, particularly textiles and leather, it was said. The problem of allocating available supplies has assumed a different form, since there will be adequate capacity to fill war and essential needs but insufficient to satisfy all civilian wants.

According to available figures, the gun and fire control programs will drop off 40 per cent for the year with shipbuilding down 34 per cent in like period; ammunition programs in the fourth quarter are set at 12 per cent above the April, 1945, figure, with gains in such items as rockets, bombs, naval ammunition and mortar shells. In all, one-fifth of the total remaining munitions production on the May 12 program was on items which call for gradual increase in military needs for the remainder of the year. With technical bottlenecks remaining to be broken, the report said, specialized material shortages limiting output of industrial items such as bombs and Army clothing will continue.

With substantial quantities of materials released as a result of cutbacks, estimates of the actual amounts to be released, Mr. Krug pointed out, still are highly tentative. It was also pointed out that the effect on total steel production of changes in requirements from the forms and shapes used for military products to those used in civilian production cannot yet be measured and similar uncertainties exist with respect to other metals. In the case of carbon and alloy steel, it was indicated that direct military requirements will drop from more than half of total shipments last year to little more than a third of a slightly less supply by the fourth quarter. In copper and copper base alloy products, the cut in military requirements was slightly greater but aluminum remains the same with a temporary increase in the third quarter. The prospective production of lead will not meet requirements unless rigid controls on its use are retained.

The effect on components has also been uneven. In the case of automotive-type grey iron castings, regularly programmed production, exclusive of any passenger automobile requirements, the report said, will take up existing foundry production for the year, allowance being made for some additional manpower. To achieve any volume of automobile production by the first quarter of 1946, the report pointed out, would require development of new sources of engine castings either in closed captive foundries or elsewhere.

Closely related to the tight situation in containers and packaging materials, there is a reported shortage of steel strapping, drums and pails which will be needed in shipping civilian production.

With regard to facilities, the report said that they will be ample for utilization of all materials and manpower that can be spared from the continuing war programs, except for a few special items. WPB has granted the automobile industry AA-3 ratings for procurement of machine tools in the amount of $32,500,000 with lesser amounts to other industries. Usable facilities will not be reconverted overnight inasmuch as time will be required to clear-out government-owned machine tools and work in process and rearrange and retool the plants.

The inadequate capacity in some materials and products will necessitate the continuing of some plant expansioin, particularly in chemicals, heavy-duty tires, tire cord and rockets. However, it is expected that further curtailment will be brought about through Procurement Agency study of present programs.

Mr. Krug estimated that unemployment will increase to 1,900,000 within three months, an increase of 1,100,000 above current levels, with a leveling off at around 1,300,000 unemployed after six months. These figures take into consideration an estimated decrease in war production manpower requirements of 4,800,000 in six months, 1,000,000 discharged from the Armed Forces and a net reduction of 200,000 in the labor force.

Commenting on the decrease of quantities of materials destined for shipment abroad, declines were noted in the case of Great Britain, the British Empire and Latin America, with a substantial decrease in shipments of machine tools, mining machinery and other industrial equipment to Soviet Russia. On the other side of the ledger, the report said, export requirements for liberated areas in Europe and Asia will increase. An example given is the increase in allotments of steel given France—from zero last year to 100,000 tons, 225,000 tons and 300,000 tons in the first, second and third quarters, respectively.

NEW MOTION PICTURE "SHIPWAYS", *had its premier at a luncheon given by E. G. Grace, Bethlehem Steel Head. The picture dramatizes the story of ships and shipbuilding, past and present, and records the effect of ever-changing phase of the war of America's naval and maritime program.*

"Know-How" Doesn't Come Overnight

The amazing precision of gun and crew of the Navy's 40mm. Bofors is not a result of a short training period. Behind this precision are months of hard gunnery practice and years of engineering and manufacturing experience.

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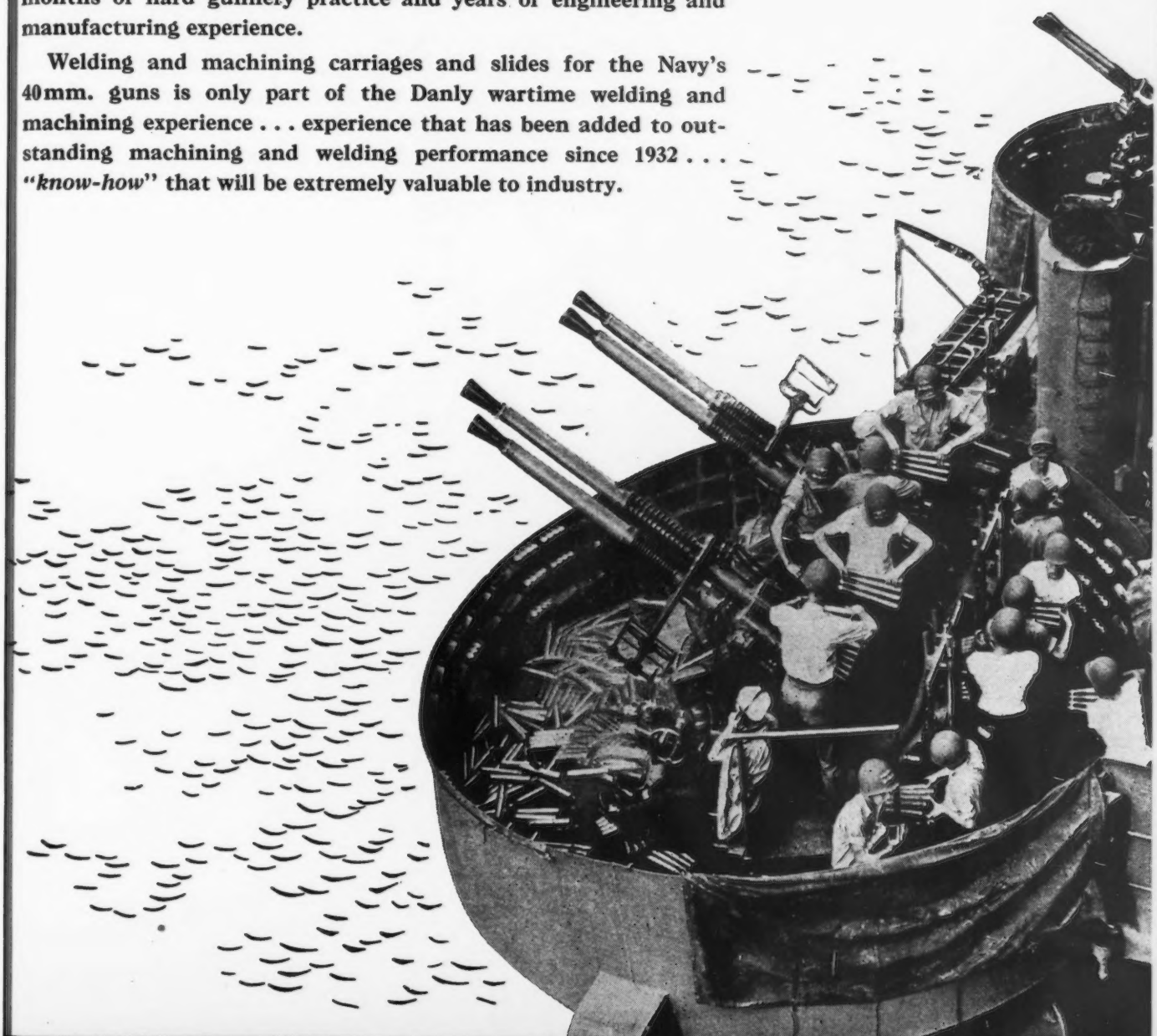

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Steel Warehouse Group Elect New Officers

Chicago

• • • **Walter S. Doxsey** was re-elected president of the American Steel Warehouse Association, Cleveland, Ohio, at a meeting of directors held in Chicago recently. F. C. Flosi, A. M. Castle & Co., Chicago, and E. M. Jorgensen, E. M. Jorgensen Co., Los Angeles, were elected vice-presidents. L. B. Worthington, U. S. Steel Supply Co., Chicago, was re-elected treasurer.

In addition to these four officers, the following were chosen to serve on the association's executive committee: C. H. Bradley, W. J. Holliday & Co., Indianapolis; Lester Brion, Peter A. Frasse & Co., Inc., New York; E. D. Graff, Joseph T. Ryerson & Son, Inc., Chicago; P. O. Grammer, Grammer Dempsey & Hudson, Inc., Newark; A. W. Herron, Jr., Jones & Laughlin Steel Corp., Pittsburgh; Richmond Lewis, Charles C. Lewis Co., Springfield, Mass.; Frank Pidgeon, Pidgeon Thomas Iron Co., Memphis; G. L. Stewart, Edgar T. Ward's Sons Co., Pittsburgh, and H. E. Williams, Williams & Co., Pittsburgh.

Adjusts Vacation Increases

Pittsburgh

• • • **An extra $175,000** representing the 1944 vacation pay retroactive increase will be paid by Allegheny Ludlum Steel Corp. Nearly $127,000 of this total will be distributed at the Brackenridge and West Leechburg, Pa., plants of the company. The balance will cover eligible wage earners at the corporation's plants in Buffalo, Dunkirk, and Watervliet, N. Y.; Wallingford, Conn.; Ferndale, Mich.; and Los Angeles.

Sees Brighter Car Outlook

Buffalo

• • • **President Roy B. White** of the Baltimore & Ohio Railroad says that prospects are bright that the WPB will release materials for enough new freight cars to permit proper handling of the continued heavy volume of war traffic.

"We have received more than 500 new cars and have an additional 2,000 on order," he said here on an inspection tour of the company's properties.

High Strength Steels Pace Lightweight Development

(CONTINUED FROM PAGE 65)

of stress existing within the structure.

The strength values given in the table are derived from tensile tests and are, therefore, directly applicable to tension members. In general, it may be assumed that the factor of safety in use for the application of ordinary steel to the structure under consideration, will be satisfactory for a high strength steel. For example, if the working unit stress in tension is 16,000 lb. per sq. in. for ordinary structural steel having a yield point of 33,000 lb. (the commonly accepted value for structural steel and the middle value for Grade A structural steel for cars), the factor of safety is 33,000 ÷ 16,000 = 2.06. Applying this factor to the yield point of 50,000 lb. of a high strength steel, gives a working unit stress of 50,000 ÷ 2.06 = 24,300 lb. which would be rounded to 24,000. It should be pointed out here that under Grades A and B of the A.A.R. specification for structural steel for cars, yield points as low as 30,000 lb. in the former and 25,000 lb. in the latter may be encountered, and that in these cases, which may be frequent, the examples given are too favorable and should be revised to conform to the values actually existing in the material supplied.

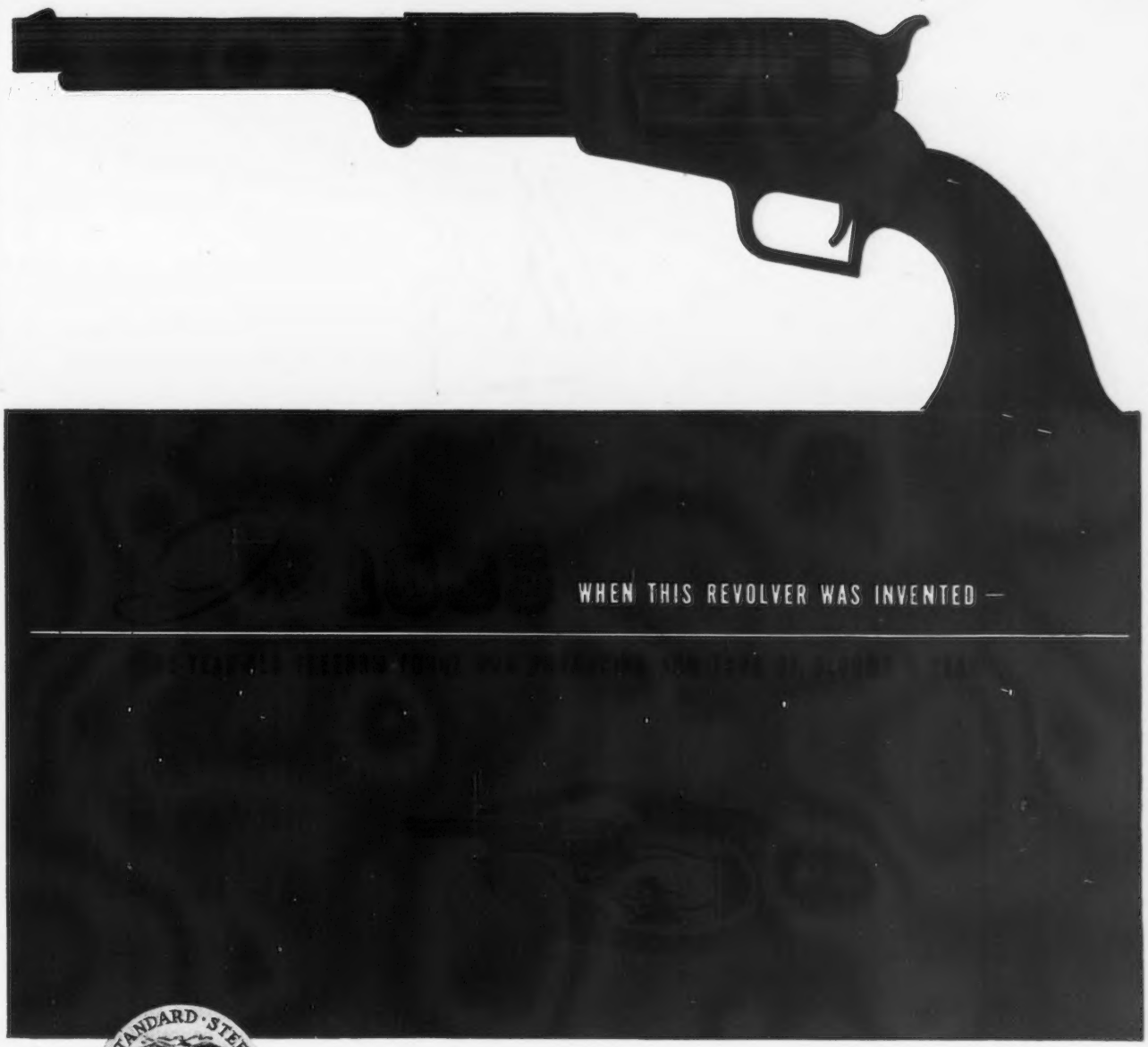
Weight saving without loss of service life is the prime benefit conferred by the high strength steels. Using the working unit stresses in tension determined in the example of the previous paragraph with reference to a 33,000 lb. per sq. in. minimum yield point, the area of members to carry a tensile load of 48,000 lb. may be determined.

Ordinary steel: Area = 48,000 ÷ 16,000 = 3.00 sq.in.

High strength: Area = 48,000 ÷ 24,000 = 2.00 sq.in.

It is seen that the superior steel effects a weight saving of 33 1/3 per cent brought about by its higher yield point.

Compression members differ from tension members in that they are subject to buckling and must be so designed as to prevent its occurrence. In the derivation of column formulas for working unit stresses, both the yield point and modulus of elasticity enter into the solution. For the lower



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With the name still a household word, it is hard to believe that the Colt revolver is 110 years old. It has been an important weapon in every war, played a big part in opening up the West in the days when every man had to be prepared to battle Indians or desperadoes at a moment's notice, and was the first step in the trend to modern automatic weapons that give today's squad the fire power of yesterday's regiment.

When the Colt revolver was invented, Freedom Forge—now Baldwin's Standard Steel Works Division—had already been turning our ferrous products for 40 years. The plant was rebuilt in 1835, with one chafery and six refinery fires, giving a capacity of 800 tons of blooms annually. Throughout the intervening time it has been an important supplier to American Industry, producing the metals that helped to fight each war, serving the railroads that helped to knit the nation together, supplying industry with castings and forgings to help work producton miracles.

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STEEL FORGINGS & CASTINGS

values of L/r (say below 75, or thereabouts), the yield point is predominant in controlling the unit stress, while above $L/r = 75$, the modulus of elasticity is the principal factor. Since the modulus of elasticity is the same for both ordinary structural and high strength steels, it is evident that weight saving will diminish as the values of L/r increase. However, most primary compression members come within the range where the yield point is the more important factor and, hence, weight saving will approach that obtained in tension members. At $L/r = 75$, the saving is about 29 per cent.

The next class of structural members which must be considered are those subjected to bending, such as beams and girders. Within reasonable limits, it can be shown that increasing the depth of such a member will often result in weight saving, but since this step is equally available with either ordinary or high strength steels, it is desirable to make any comparison upon the basis of equal depths. Theoretical investigation indicates that weight savings should approach those of tension members.

Cold Formed Sections

Where the design involves rolled beams and channels, the weight saving to be obtained with high strength steels will depend upon the section used in ordinary structural steel. There are practical limits of weight and thickness below which structural shapes cannot be rolled and if, for example, a beam of structural steel is at the minimum limit, then it is impossible to achieve any weight reduction by direct substitution. However, by the use of sections cold formed from plates, sheets, or strip, reduction in weight can be secured and such sections may prove acceptable substitutes. With suitable techniques and equipment it has been proven that these steels can be welded quite satisfactorily by either the electric arc or resistance processes. This adaptability to welding permits still greater distribution of metal to the point where it is most needed and to some extent frees the designer from the limitations imposed by rolled structural shapes. If rolled beams and channels are designed for section modulus, regardless of the depth, there will be an average weight saving of about 25 per cent.

The preceding discussion of the weight-saving possibilities of high strength steels has been predicated

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upon obtaining the indicated thicknesses in all cases. In practice, steel shapes are available only in standard sizes and to stated thicknesses. Unless an order involves sufficient tonnage to warrant deviation from these standards, the designer must select the sizes that come nearest to his calculated requirements. Experience with a wide variety of applications has demonstrated that with all factors considered, the weight saving will average about 25 per cent. Skillful designing may increase the saving, and it may even approach that of tension members under the most favorable conditions.

The reduction in thickness which results from the use of high strength steels, may often introduce problems of elastic stability, a field of design which may be more or less unfamiliar to many engineers. Current specifications for structural steel contain numerous limiting clauses whose purpose is to prevent local buckling due to elastic instability, and, therefore, many engineers are unaware of the problem involved. However, when designing for high strength steels, it is essential that study be given to this matter.

Factor of Elastic Stability

The theory of elastic stability has received much attention in recent years, particularly in the aircraft industry. It is an extensive subject that cannot be covered in a discussion such as this. In the solution of many problems, it has been found most desirable to develop the required information as to stability by means of tests upon actual structures or upon their members. Here theory and practice go hand in hand. The more complicated the structures, the more vital has been the need for testing theory against practice.

When weight saving is the important item, and it is in most cases where high strength steels are under consideration, one can readily appreciate that the more precisely an engineer knows the stresses to be carried, the more efficiently he can dispose the steel, and quite possibly with a lower factor of safety. To attain a better knowledge of the stresses and their distribution, requires the application of some of the newer methods of analysis.

During the past few years there have been some noteworthy developments including electric strain gages and accompanying apparatus for measuring and recording test results.

The use of these gages has widened rapidly in many fields for the purpose of measuring the actual stress conditions in structures under service loads and in testing laboratories.

Mobile structures constitute a field for which high strength steels are particularly promising in their possibilities. They are just the class of structures for which the load conditions are most apt to be uncertain. Past failures in service with ordinary steel have usually been corrected by blindly adding material until the possibility of future failure was finally stifled, without getting at the root of the trouble. This is not a successful method for reducing weight. A fertile field of practical research into the actual stresses existing in mobile structures is offered by the present lack of knowledge.

At present, the only feasible way to solve the problem of substituting high strength steels, where knowledge of stress conditions is meager, is to reason from existing structures in ordinary steel. The general method of substituting on the basis of equivalent strength has been set forth in the previous discussion. This method encounters difficulty where corrosion conditions are such that the original thickness in ordinary steel is not based upon strength, but on providing an allowance for eventual reduction in thickness due to corrosion.

Deflection should be considered in any examination of a design for high strength steels. Every deflection formula has the modulus of elasticity E in the denominator. Since the value of E is the same for either ordinary or high strength steel, it has no effect in comparisons. For beams of equal span, the formula is of the form

$$y = \frac{Kf}{Ed} \text{ where}$$

y = Deflection
K = A constant depending upon the span and loading
f = Unit stress in extreme fiber in bending
E = Modulus of elasticity
d = Depth of the beam

An examination of this formula indicates that for a given span and load with the depth remaining unchanged, the deflection will be proportional to the unit stress. We have seen that the unit working stress is determined from the yield point.

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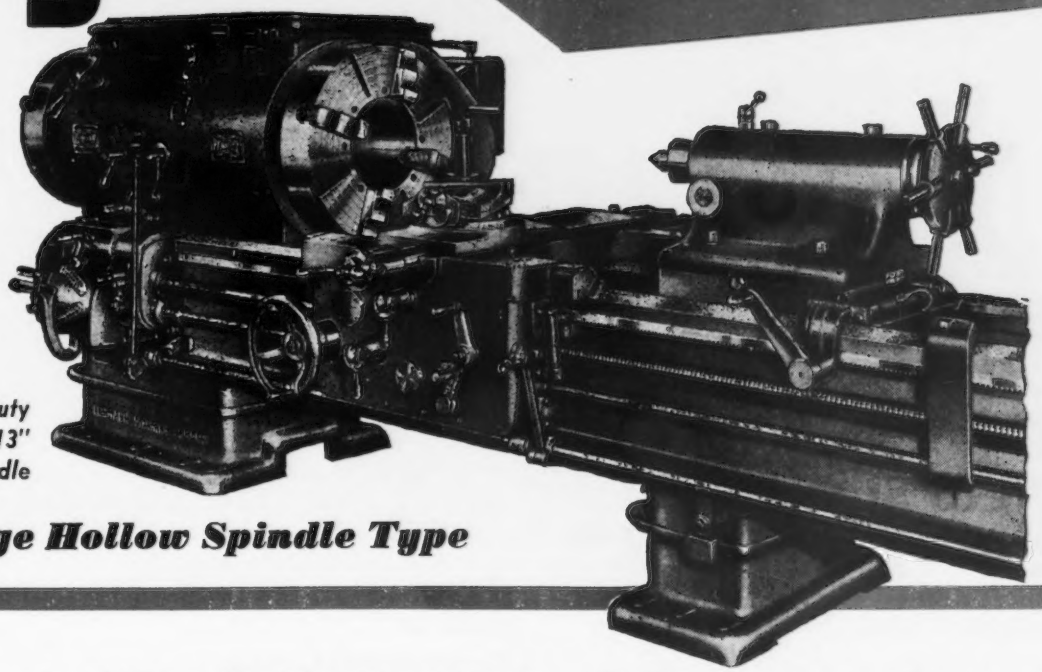

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Microscopic examination reveals that surfaces of parts which have been cold-worked by upsetting, extruding and rolling of threads are less susceptible to fatigue cracks than surfaces formed by other methods which are commonly used. In the modern heat treated fastening it is important to reduce "notch sensitivity" (occurring at threaded section), since heating and quenching opens tears and fissures and sets up stresses and chills which shorten the life of the fastening. Similarly, on plated products tears and fissures cause unequal deposits of plating, and consequent unequal fits and distribution of force on the threads and head. Cold rolling produces round radii of thread roots, and tests show that these rounded radii *increase fatigue strength up to 150%!*

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which leads to the conclusion that the deflection of a structure of high strength steel will be about 50 per cent greater than for ordinary steel, unless this added deflection is controlled by the introduction of stiffening features. In the majority of cases, an increase of this amount in deflection is of negligible proportions.

Service Tests Needed

Thus far, nothing has been said about some of the collateral questions which are bound to arise when studying the suitability of a high strength steel for application in a particular structure. An engineer will require data respecting the performance of the steel under fatigue and impact when operating at subzero temperatures. Service tests are the ultimate answer, but they are not always available. Laboratory tests are the next best source, and the more nearly such tests approximate service conditions, or can be shown to be correlative with service, the more weight can be accorded to them as useful guides in forming correct judgments.

All designing is done on the basis of "pounds per square inch," and any test which uses other units in recording its results is difficult to evaluate in terms of design. Such tests, in particular, need the experience of service to establish their value. In a series of articles by Dr. H. W. Gillett, commencing in the Nov. 22, 1943, issue of the magazine *Steel*, Dr. E. C. Bain was quoted as saying: "The importance of practical testing should be stressed; the best test specimen *is an actual part* loaded to simulate the state of stress encountered in service but to an aggravated degree if necessary."

Impact Tests Evaluated

Notch impact tests on Charpy and Izod specimens measure their results in foot-pounds of energy absorbed and thus have only a qualitative significance which cannot be directly translated into terms of maximum permissible dynamic load in pounds per square inch. As matters stand today these two tests have been performed extensively and although familiar to most engineers, their interpretation has not been a matter of very widespread agreement or understanding. Most low carbon structural steels are quite notch sensitive at moderately low temperatures. However, these steels, when designed and fabricated free of notches and severe

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Many Ajax Furnaces are now in commercial operation for brazing: copper and aluminum heat exchange units (refrigeration, aircraft, etc.); alloy steel automotive parts (oil filters, starter assemblies, etc.); business machine stampings, condensers, evaporators, etc. Free of obligations, specimen work may be submitted to the Ajax experimental department for Brazing, Isothermal Heat Treatment, Carburizing, High Speed Tool Steel Hardening or any other heat treatments in the temperature range of 300 to 2400 degs. F.

Mass production industries, by their unrelenting efforts to produce more at lower cost, have steadily expanded applications of salt bath brazing since the process was first introduced by Ajax. Perhaps one of the simplest ways for joining metal pieces, the method merely consists of dipping either ferrous or non-ferrous assemblies of stampings, tubing and screw-machine parts into an Ajax-Hultgren Salt Bath Furnace where the molten salt is maintained at a temperature above that of the brazing alloy's melting point. The brief immersion (only 45 to 120 secs.) is followed after removal of the work by either direct quenching or air cooling as required. Faster brazing by intimate conduction, accomplished in molten salt baths which seal the work from all atmosphere, provides equal productive capacity in a fraction of the floor space required for costly radiant type furnaces. Decarburization and scale are prevented at all times—in the bath, as well as upon removal when work is covered with a protective film of liquid salt. On one Ajax brazing installation, similar to the above illustration where 44 copper tubes are tightly and uniformly bonded to a radiator manifold in one operation, a job which formerly was done by torch brazing in 2¾ hours now requires only 90 seconds to join 332 finned tubes in a heat transfer unit. It will pay to investigate Ajax Salt Bath Brazing! See footnote at left.

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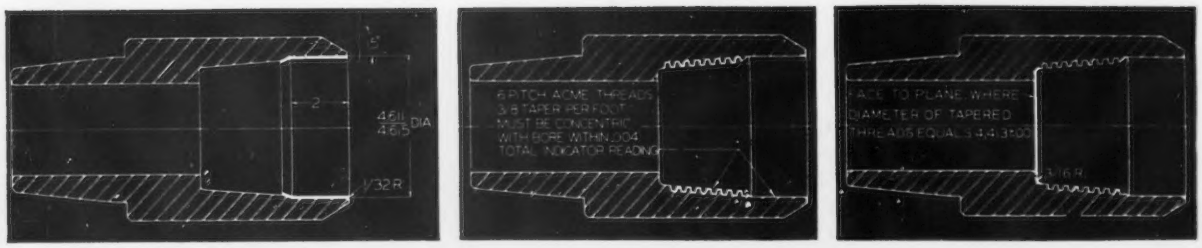

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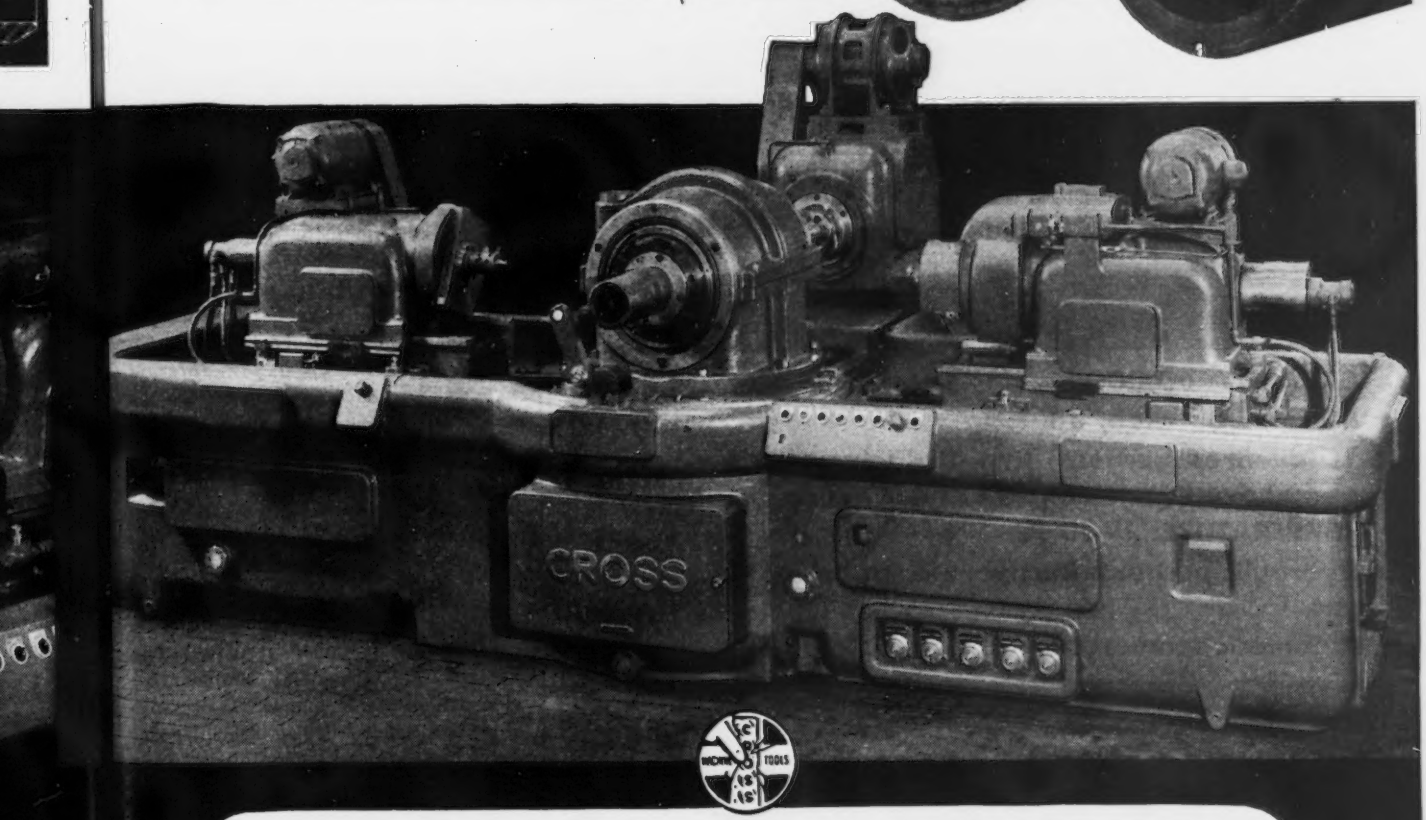

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multi-axial stress, perform satisfactorily even under severe conditions of dynamic loading. One wonders, therefore, whether the emphasis upon notched bar impact testing may not in part be misplaced. As a matter of fact, the use of the word "impact" in these tests has been quite misleading since they do not even qualitatively measure the ability of a structural steel to withstand high velocity loading when no notches are present. Actually, it has been shown that if the Charpy or Izod specimens are loaded to failure by slow bending the energy absorption is practically the same as under impact. Conversely, steels which exhibit brittle behavior in the Charpy and Izod tests will withstand extremely high loading velocities in pure tension without departing from their normally ductile behavior. Recent studies of these two tests indicate that they do indeed have a proper place in materials engineering in such applications as those in which ballistic loading velocities are anticipated along with notches and very high operating or fabricating stresses. They are likewise important to the designer anticipating severe multi-axial stresses, particularly at low temperatures such as those encountered in certain chemical processes. These thoughts on the subject are substantiated by the thousands of structures built of both ordinary and high strength steels that have performed satisfactorily under rigorous operating conditions in actual service at very low winter temperatures. *The size and mass of actual structures must make the absorption and distribution of energy a far different matter than may be determined by small specimens that can be slipped into a vest pocket.*

Results of fatigue tests in common use are reported in terms of pounds per square inch, and do come within the terms of design. Polished specimens yield quite different results from those with original mill scale or with geometrical irregularities, but they do serve as a comparative measure of performance. It is common practice to devise special tests and apparatus to simulate service conditions, confirming the fact that such tests have real value and carry weight. Considerable evidence has accumulated to indicate that in many cases fatigue failures arise from notches, scratches, tool marks, localized corrosion, discontinuities in the metal, or abrupt changes in cross-section—all of which give rise to

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the phenomenon known as stress concentration.

To illustrate this point, the excellent analogy originating with H. Malcolm Priest is quoted: "It may be helpful to think of stress flowing or traveling through the steel much as water flows in a smooth channel. A notch or other interruption is like a pier in the channel, tending to divert the stress flow, and causing a congestion at the base of the notch, similar to the turbulence of the water. Such an action can raise the unit stress in a very localized region by two or three times that of the average unit stress. Action of this kind is not due so much to the steel itself as to the geometry of the member. It must be said, however, that some steels are more notch sensitive than others; that is, cracks seem to appear more readily."

Notch Sensitivity

The metallurgical factors which influence notch sensitivity are not too well understood, but some qualitative conclusions can be advanced. The feeling is prevalent, as indicated by the concluding sentence of the above quotation, that certain types of high strength steel are less notch sensitive than others, and though there may be some truth in this, it should be regarded as one of the least important factors. Actually, grain size and thermal history (that is to say, rolling and finishing temperatures) are vastly more important. This belief is supported by the effect that normalizing and heat treating have upon these compositions. For example, the notch sensitivity of practically all hot rolled structural steels is consistently poor in thickness over 1 in. With decreasing thickness there is considerable improvement in the Charpy and Izod values obtained, and this improvement extends to lower testing temperatures, suggesting that in hot rolled steels finishing temperatures and final grain size are important. These considerations indicate that greater attention should be paid to certain phases of steel metallurgy aside from a critical study of chemical analyses.

No design can be considered adequate if it has not taken into account the performance of the steel as it goes through the forming and fabricating processes. Here ductility plays an important part. High

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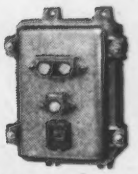

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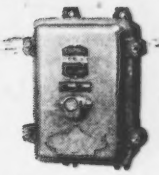

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strength steels are popularly said to be stiffer than ordinary structural steel. This is due to the fact that the higher yield point requires greater effort or force to deform the steel beyond the elastic range, as in pressing or bending. This extra effort is offset in large measure by the thinner sections in high strength steels. However, it has been found advisable in practice to use larger radii or fillets in forming operations.

Weldability Factors

One fabricating process, namely welding, has raised many questions, some of them of serious proportions. From the welding standpoint it is desirable to select a high strength steel composition in which the elements used to obtain the desired tensile properties are selected or adjusted in such a manner as to keep the weld hardenability of the alloy at a minimum. The seriousness of this problem with most of the high strength steels does not manifest itself in the welding of sections ½ in. or lighter in thickness. With greater thicknesses, however, the intensity of the weld-quench effect is increased and the use of special techniques or electrodes may be necessary. Much has been learned during the war of methods by which steels having a relatively high weld hardenability may be satisfactorily fabricated either by fusion or electric resistance methods. This entire problem, of course, is greatly minimized by the selection of high strength steels having relatively low carbon contents. In welded structures even ordinary structural steel has been involved in trouble, but the cause is generally to be found in mistakes of design, overlooking notch effects or failing to recognize zones of stress concentration. The most satisfactory welded structures are those in which these factors are considered and a real attempt is made to adapt the design to the characteristics of welding.

Welding is essentially a metallurgical process, involving the melting and subsequent rapid cooling of the base metal, and the intermingling of the metal of the electrode or welding rod with the base metal. It is well known that the rate of cooling has important effects upon the character of the final state of the metal and its hardness in what is known as the heat-affected zone. The chemical composition of the base metal has a

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vital bearing on the behavior of a steel in the welding process.

Since the high strength steels achieve their superiority by the addition of alloying elements, the effect of which is to alter the behavior in welding operations, it is natural that an engineer should want assurance as to the performance which may be expected with any particular steel. The same questions as to corrosion resistance, strength, impact, and fatigue that are important for the steel itself are pertinent for welds in the steel, and the approach in reaching the answers is the same in both cases.

Not many subjects have received such extensive and intensive research at the hands of skilled metallurgists and engineers as that of welding. They have had to pioneer the way through many unknown factors. The usual laboratory tests have been employed and others have been devised. Here again, correlation with service is essential to sound judgment and tests that have little practical significance should be avoided. Welding is in extensive use for fabrication, and the resulting structures are now providing dependable service records. High strength steels are in many of these structures, particularly in railroad cars, and they are performing in a most satisfactory manner.

Saving in Dead Weight

Finally there is the question of how much the prospective owners and operators of modern lightweight equipment can afford to pay for weight saving. The factors to be considered will vary greatly with the conditions of the service. In some services, in which severe mechanical abuse and highly corrosive conditions predominate, the additional cost of the high strength steel in thicknesses equal to those normally used in plain copper-bearing steel may be indicated and fully justified. In general, however, equal service life and maintenance costs may be obtained with substantial weight reductions of the order discussed earlier, and of a degree safely within the limits provided by the superior properties of the corrosion-resistant highstrength steels. The initial cost of these light, highly efficient structures need be little, if any, more than their cumbersome predecessors. Thorough studies of these questions indicate that the operating savings to be realized from dead load reduction outweigh con-

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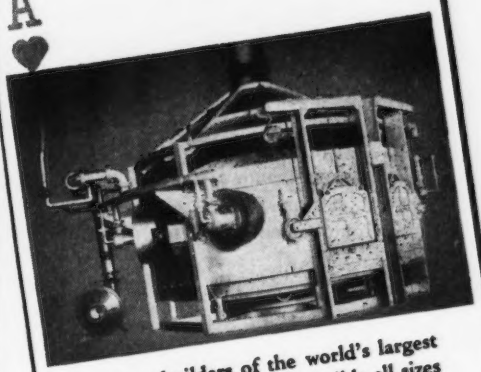

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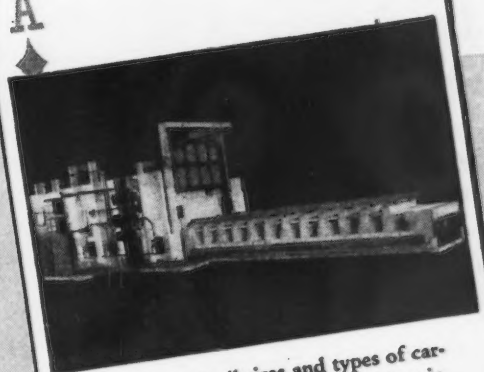
Conventional or unconventional, we combine economics with engineering—a service we call Engineered Heat. So if you have any heating problems, put Salem to work for you. All correspondence held in strictest confidence, of course.

Salem builds all sizes and types of heat treating furnaces and circular soaking pits

SEND YOUR INQUIRY TO SALEM

Continuous pusher type heat treating furnace with a double chamber.



Salem builds all sizes and types of car-type furnaces for gas, oil or electric, direct or recirculating.

SALEM **SALEM** OHIO

ENGINEERING CO.

SALEM ENGINEERING COMPANY

siderations of added service life in many mobile structures.

The design of freight cars, including materials employed, is a potent factor in the cost of transportation due to its effect upon the ratio of pay load to dead weight. During the past 20 years, the weight of freight cars has increased more than the average weight of the loads they carried. On many roads, the gross ton-miles, exclusive of locomotive and tender, have been three times the revenue ton-miles. Special loading rules in effect during the war have improved this ratio, but relaxation of such restrictions in postwar days may bring results back to approximately prewar figures. Expedited delivery has been one of the most effective means of competing with other transport agencies; hence, to retain traffic under postwar conditions, the railroads will need to move freight trains faster, and this will again emphasize the need for lighter cars.

Operating Costs Reduced

It is encouraging that studies now in progress promise to clear away some of the contradictory opinions concerning the savings to be obtained from reduction of dead weight in freight cars. At present it is contended that savings range all the way from 3.4 mills per ton-mile for weight carried in refrigerator cars, down to 0.379 mills for 50-ton box cars. The high rate for the cost of hauling additional weight in refrigerator cars is supported by expert evidence submitted to the Interstate Commerce Commission about ten years ago. The low rate of 0.379 mills for box cars is shown in the Mechanical Advisory Committee's report, which also showed a cost of 1.3 mills for 50-ton hopper cars. At about this same time Ralph Budd estimated that the cost of moving a ton-mile in a freight car, not counting contents, was 1.13 mills. That the actual savings are substantial and fall somewhere in between the extremes mentioned, seems well supported from the fact that 22 railroads have used high strength steel in building more than 31,000 box cars, and that this figure represents approximately 60 per cent of all of the high strength steel equipment now in service. It is not likely that the 22 railroads referred to would have adopted lightweight designs if

SAVE WITH INGERSOLL *Inserted Blade* ARBOR CUTTERS

ALF SIDE MILLS • FULL SIDE MILLS • STAGGERED TOOTH SLOTTING • CHANNELING • INTERLOCKING

NTERLOCKING

CHANNELING

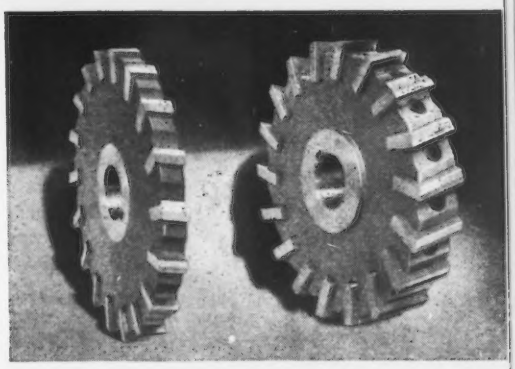
LOCK NARROW SLOTTING

ULL SIDE MILL

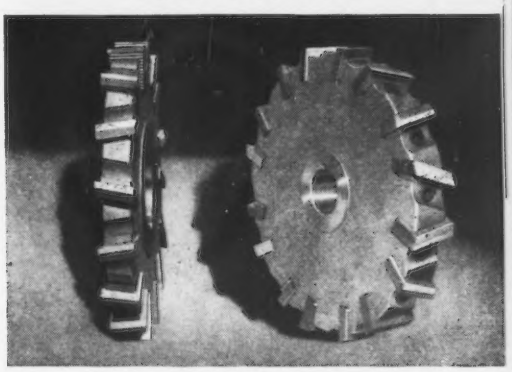
Ingersoll *inserted blade* arbor cutters are replacing solid high speed steel and solid brazed tip designs due to economy of replacement blades. It is not necessary to purchase complete new cutters, as only the *inserted blades* are perishable. The cost of a new set of blades is much less than the cost of a new solid type cutter.

There is an Ingersoll *inserted blade* cutter for all straddle milling, keyway cutting, channeling, or slotting operations requiring cutters from 4" diameter and 3/8" wide up to any size that may be required. Several different styles and types are illustrated here and each has its particular field of application. Cutters may be furnished with high speed steel, cast alloy, or carbide tipped blades, and with cutting angles suitable for cast iron, steel, aluminum, or any other non-ferrous alloy.

Ingersoll designs and manufacturers inserted blade milling and boring tools of all types. Write for Engineering Specification Sheets describing the standard face mills, arbor cutters, end mills, and helical cutters.

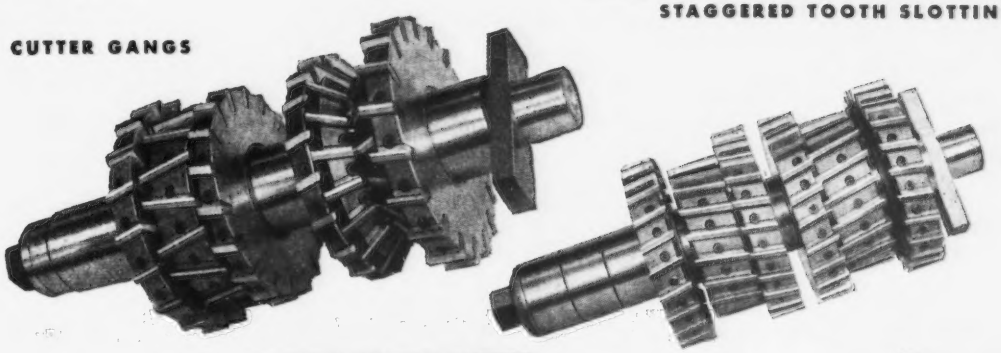


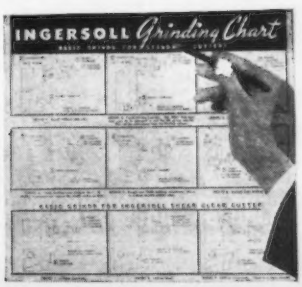
HALF SIDE MILLS



STAGGERED TOOTH SLOTTING

CUTTER GANGS





Use This
WALL CHART

Wall chart suitable for mounting in tool room illustrating proper grinds for milling cutters.

Write for
INGERSOLL CUTTER GRINDER BULLETIN

describing operation of machine and fundamental principles of good cutter grinding.

THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILL., U.S.A.

they had placed any reliance upon the inconsequential savings for box cars published in the Mechanical Advisory Committee's report.

Moreover, the rapid technological progress now being made points, as never before, to obsolescence as a factor of the greatest importance in determining the most economical span of life. Data assembled after a decade during which the performance of thousands of mobile, lightweight structures have been examined, seem to indicate that the period of service life for which the equipment has been designed heretofore should be reexamined and perhaps shortened in order to take full advantage of the utmost that can now be obtained in weight saving and pay load capacity.

The age of freight cars now in operation on American railroads has been reported by the American Railway Car Institute which shows 539,000, or 30.7 per cent, of the cars owned by Class I railroads are over 25 years old; 299,000, or 17 per cent, are 21 to 25 years old. Thus, it is shown that nearly one-half of all of the equipment operated was built to designs of more than a generation ago. But it is not to be concluded that a majority of these cars are in line for early retirement. In a very real sense the figures quoted are misleading because, in many instances, much of the old equipment has been renewed repeatedly by the railroads and returned to service. Thus, the original load ratios are maintained.

This discussion has been aimed at a consideration of the principal features of designing for high strength steels. Some of the best of these have now been in service for a sufficient period of time to make it appear that the problems of design where they are employed are no longer so largely concerned with the steels themselves. Ten years of experience with various applications have built a record of performance in service that attests to their satisfactory use and lasting qualities. In fact, it can now be shown that the initial claims made for some of them have been exceeded by a substantial degree.

This is gratifying to the author, who takes no little satisfaction in concluding this discussion by quoting from an address made before the Railroad Division of the American Society of Mechanical Engineers at its annual meeting in New York, Dec. 7, 1933. He said then:

"I believe we are at the beginning of a new era in the application of steel to all types of construction. In some fields, activities have been dominated almost wholly by the various grades of ordinary steel. The era that is now opening, while it will continue for a long time to base its chief activities upon ordinary grades, will nevertheless be influenced more and more and in various directions by the new alloy steels of high strength and rust-resistant quality. Not only in the field of railroad equipment, but in other fields too numerous to mention, this effect is bound to be apparent.

"The possibilities are well nigh incalculable. I do not want to indulge in imaginative forecasts or exaggerate the importance of a movement that admittedly is still in its infancy. But, as a general proposition, whenever new materials have been put into the hands of man, he has used them freely and created new requirements for their utilization. Thus new materials actually make their own era."

Weldability of Steels

(CONTINUED FROM PAGE 80)

for example, that under a given test control steel C shows 10 per cent cracking and the new test steel T shows 30 per cent cracking. Looking in the 10 per cent column at the 30 per cent line the index of crack sensitivity of the steel T is found to be 0.87.

If new tests are run under which the steel C cracks 30 per cent, 40 per cent, and 70 per cent, looking in the column of these values for the index 0.87 and thence over to the left column, it may be predicted that the failures of steel T will be, in the respective cases, 60 per cent, 70 per cent and 90 per cent.

For intermediate values, Table XXII is used. Let us assume that control steel C shows 18 per cent cracking in a certain test. Looking in the 10 per cent row and the 8 per cent column, the apparent susceptibility of this steel is +0.153. Under the same conditions, let us assume steel T shows 93 per cent cracking. The value of A equals −.246 for this test. With C taken as standard at 1.0, the index of T therefore equals 1 −0.153 −0.246, or 0.601.

Contact KAYDON *of Muskegon*

FOR ALL TYPES OF BALL AND ROLLER BEARINGS 4" BORE TO 120" OUTSIDE DIAMETER

Another KAYDON *Creation*

Illustration shows a KAYDON Double Row Taper Roller Bearing 16.000" x 24.000" x 7.375" for Heavy Duty Precision Grinder.

THIS KAYDON Bearing was specifically designed for use on the table spindle of a 116" capacity double-head, heavy-duty precision grinder. The grinder is made by a well known midwestern manufacturer. KAYDON bearings, designed and produced to meet the specific requirements of this grinder, have proven eminently satisfactory.

Here, again, is proof that it pays to counsel, in confidence, with KAYDON — specialists in the production of all types and sizes of ball and roller bearings from 4" I. D. to 120" O. D. Don't compromise on a bearing that is not designed to meet your exacting needs. Contact KAYDON!

Note, too, that KAYDON provides atmospheric control in heat-treating, as well as flame hardening, precision heat-treating, metallurgical laboratories, microscopy and physical testing. Capacity for general production is increasing. Now is the time to plan ahead—with KAYDON!

KAYDON *Types of Standard or Special Bearings:*

Spherical Roller • Taper Roller
Ball Radial • Ball Thrust
Roller Radial • Roller Thrust

THE KAYDON ENGINEERING CORP.

MUSKEGON • MICHIGAN

New in Name . . . Old in Experience

Report on Lend-Lease Covers Up to April 1

Washington

• • • Recapitulation of the amount of lend-lease equipment in thousands of dollars to various countries is shown in the tables below:

LEND-LEASE EXPORTS TO UNITED KINGDOM

Thousands of Dollars

	January-March 1945	Year 1944	Cumulative to April 1, 1945
Ordnance and ammunition	131,966	838,365	1,880,151
Aircraft and parts	192,334	1,076,784	2,213,266
Tanks and parts	30,083	470,797	1,020,978
Motor vehicles and parts	60,140	344,129	668,177
Watercraft	4,685	250,757	649,825
All munitions	419,208	2,980,832	6,430,397
Petroleum products	172,397	659,145	1,293,274
Industrial materials and products	73,388	564,420	1,868,575
Agricultural products	149,774	893,007	3,185,146
Total	814,767	5,097,404	12,775,392

LEND-LEASE EXPORTS TO CHINA AND INDIA

Thousands of Dollars

	January-March 1945	Year 1944	Cumulative to April 1, 1945
Ordnance and ammunition	6,820	35,962	260,757
Aircraft and parts	45,640	336,497	573,382
Tanks and parts	1,505	23,855	122,042
Motor vehicles and parts	33,659	113,388	294,544
Watercraft	4,050	14,784	41,846
All munitions	91,674	524,486	1,292,571
Petroleum products	38,806	52,609	118,289
Industrial materials and products	47,503	171,797	464,756
Agricultural products	15,447	86,198	147,723
Total	193,430	835,090	2,023,339

LEND-LEASE EXPORTS TO U. S. S. R.

Thousands of Dollars

	January-March 1945	Year 1944	Cumulative to April 1, 1945
Ordnance and ammunition	22,376	190,421	798,343
Aircraft and parts	85,817	557,869	1,495,968
Tanks and parts	36,415	166,373	460,059
Motor vehicles and parts	99,077	503,318	1,157,064
Watercraft	14,408	84,929	240,159
All munitions	258,093	1,502,910	4,151,591
Petroleum products	13,237	40,482	84,878
Industrial materials and products	261,907	1,306,891	2,700,223
Agricultural products	128,852	579,062	1,473,003
Total	662,089	3,429,345	8,409,695

LEND-LEASE EXPORTS TO AUSTRALIA AND NEW ZEALAND

Thousands of Dollars

	January-March 1945	Year 1944	Cumulative to April 1, 1945
Ordnance and ammunition	5,759	13,813	138,546
Aircraft and parts	34,644	130,822	346,641
Tanks and parts		793	55,294
Motor vehicles and parts	10,993	49,728	193,146
Watercraft	1,147	7,253	12,303
All munitions	52,543	202,409	745,930
Petroleum products	5,402	53,393	141,702
Industrial materials and products	19,505	100,598	329,215
Agricultural products	2,973	10,056	40,242
Total	80,423	366,456	1,257,089

SAVED FROM THE SCRAP PILE

Breaking a large crankshaft can be a serious matter these days—but Thermit welding can make it much less serious.

Instead of weeks of "down time," while waiting for a new shaft, only 48 hours or less may be required to make the repair with Thermit welding.

Thermit welded repairs are strong and durable—strong as a forging of the same cross-section. Machining is seldom required in preparation for welding and subsequent stress-relieving is unnecessary.

Use Thermit welding to save broken crankshafts, housings, axles and other heavy parts—and for fabrication of very heavy units. Thermit welding may be done on your own premises or at one of our plants at Jersey City, Chicago, Pittsburgh or South San Francisco. Send for new booklet, "Thermit Welding" which explains the process in detail. Metal & Thermit Corporation, 120 Broadway, New York 5, N. Y., Albany, Chicago, Pittsburgh, South San Francisco, Toronto.

Thermit Welding

Report on Lend-Lease Covers Up to April 1—Continued

Recapitulation of the amount of lend-lease equipment in thousands of dollars to various countries is shown in the tables below:

LEND-LEASE EXPORTS TO AFRICA, MIDDLE EAST AND MEDITERRANEAN AREA

Thousands of Dollars

	January-March 1945	Year 1944	Cumulative to April 1, 1945
Ordnance and ammunition	17,060	146,110	701,512
Aircraft and parts	57,289	396,112	884,360
Tanks and parts	8,763	177,772	631,699
Motor vehicles and parts	23,049	132,054	481,879
Watercraft	11,854	17,685	64,192
All munitions	118,015	869,733	2,763,642
Petroleum products	4,562	24,728	84,608
Industrial materials and products	38,540	187,273	646,815
Agricultural products	62,081	113,382	317,993
Total	223,198	1,195,116	3,813,058

LEND-LEASE EXPORTS TO LATIN AMERICA

Thousands of Dollars

	January-March 1945	Year 1944	Cumulative to April 1, 1945
Ordnance and ammunition	853	9,922	31,633
Aircraft and parts	8,677	40,329	105,269
Tanks and parts	45	7,763	30,555
Motor vehicles and parts	187	6,985	21,305
Watercraft	92	857	1,565
All munitions	9,854	65,856	190,327
Petroleum products	15	61	216
Industrial materials and products	2,260	15,881	36,210
Agricultural products	19	32	106
Total	12,148	81,830	226,859

LEND-LEASE EXPORTS TO ALL COUNTRIES

Thousands of Dollars

	January-March 1945	Year 1944	Cumulative to April 1, 1945
United Kingdom	814,767	5,097,404	12,775,392
U. S. S. R.	682,089	3,429,345	8,409,695
Africa, Middle East and Mediterranean area	223,198	1,195,116	3,813,058
China and India	193,430	835,091	2,023,339
Australia and New Zealand	80,423	366,456	1,257,089
Latin America	12,148	81,830	226,859
Other countries	45,601	281,696	805,025
Total	2,031,656	11,286,938	29,310,457

Percentage Distribution

	January-March 1945	Year 1944	Cumulative to April 1, 1945
United Kingdom	40.1	45.2	43.6
U. S. S. R.	32.6	30.4	28.7
Africa, Middle East and Mediterranean area	11.0	10.6	13.0
China and India	9.5	7.4	6.9
Australia and New Zealand	4.0	3.2	4.3
Latin America	.6	.7	.8
Other countries	2.2	2.5	2.7
Total	100.0	100.0	100.0

Now in its FOURTH YEAR OF NATIONAL USE

HOLDS MORE

Each Neoceta bristle is channeled to hold more paint. High carrying capacity. Fewer dips. Less Fatigue.

SPREADS BETTER

Neoceta bristles brush out well. Carry and spread paint evenly over maximum area. Not limp. Not too stiff.

WORKS EASIER

High capacity—perfect balance plus fewer dips—less effort. Light stroke—little brushing.

FINER FILM

Perfectly tapered Neoceta bristles lay paint smoothly.

LONG LIFE

Neoceta stands up under hard service. May be used in all oil, casein and water paints, varnish base enamels, varnishes and shellac. Cleans easily.

*. . . . THE NEW SCIENTIFIC BRISTLE FOR A BETTER PAINT BRUSH

The name **NEOCETA** is a registered Trade Mark of the Pittsburgh Plate Glass Co.

WORTHY COMPANION OF THE FAMOUS *Gold Stripe* BRUSHES

PITTSBURGH PLATE GLASS COMPANY

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6 YEARS RESEARCH

Back of every Neoceta brush is six years of scientific research—four years of actual use by master painters from coast to coast. Send for the scientific facts in the booklet "The Fascinating Story of Neoceta".

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MACHINE TOOLS

. . . News and Market Activities

$283,000,000 in Unfilled Orders On Tool Builders' Books at End of April

Cleveland

• • • With most of the machines on the ammunition program already delivered, and especially those required for shellmaking, there were unfilled orders amounting to $283,000,000 at the end of April. Of this total, unrated orders or domestic business amounted to about $90,000,000, with the balance scheduled for the services and reconversion.

This, however, is not a good criterion, because some domestic business is now rated, and there is no easily accessible breakdown of service requirements and reconversion business. Some of the automobile business, of course, is now rated, but even so, it was originally thought that about half the business on the books would be for reconversion by this time.

Cancellations were heavy in April, and are going to be heavier in May, when the final results are tabulated. This trend seemingly indicates that June will see the heaviest cancellations yet in machine tools and will certainly result in the paring down of unfilled orders. At the moment, the industry is shipping at the rate of $40,000,000 a month, and using the $283,000,000 figure as a base that would mean that the machine tool builders could ship for seven months at the current rate without any new orders.

Here and there in the industry it is felt that the reconversion business hasn't started to come yet, and what they have on their books at present is only the beginning. May business, as might be expected, will be fairly heavy with reconversion orders and according to reports, reconversion's large demand for machine tools will take up a large amount of the slack caused by the extensive cancellations during May and particularly lend-lease.

Russian business is still very heavy. A lot of it has not been canceled and builders have been told to go ahead and finish it, apparently on the assumption that some of it can be diverted to France, Belgium, and other countries, and that Russia can still take some of it.

There have been some cancellations in munitions program orders, but with the bulk of this business already delivered, there are not very many munitions orders on the books for machine tools that will be canceled. What is left is largely confined to programs that are still new programs, and will be continued as long as we fight Japan, including the heavy aircraft program for jet propulsion.

Gillette Says Board Refuses to Request Surplus Act Changes

Chicago

• • • Although strong sentiment in Congressional and business circles desires revision of the Surplus Property Act to make it more workable, the Surplus Property Board will not recommend modification for the present, Guy M. Gillette, retiring chairman of the board said here recently.

"Until Congress decides to take on the job of making these revisions, the board recognizes the act as the law of the land," he declared. "When experience dictates the necessity for change, you can depend upon us to take note of the fact and make recommendations accordingly."

Mr. Gillette emphasized the need for action with respect to reconversion problems even while the Japanese War continues, both among plants whose war contracts have been terminated and those still engaged in war work.

"The reconversion problems of these plants have been recognized by the Surplus Property Board, particularly as they relate to the need for machine tools and equipment. The board has recently issued a regulation (Regulation 6) providing that war contractors will be able to take the necessary steps to tool up now so that they may be ready to resume civilian production at the earliest possible moment. One part of that program will permit sales to contractors in possession by the owning agencies —chiefly the Army, Navy and Defense Plant Corp. Contractors will be able to purchase this equipment now, while they are still in war production, without waiting for them to be formally declared surplus."

He warned that the board cannot indefinitely hold up disposals of any property, declaring that to do so would mean a loss in value at the time of ultimate disposal because of spoilage and obsolescence, plus the added cost of storage and handling.

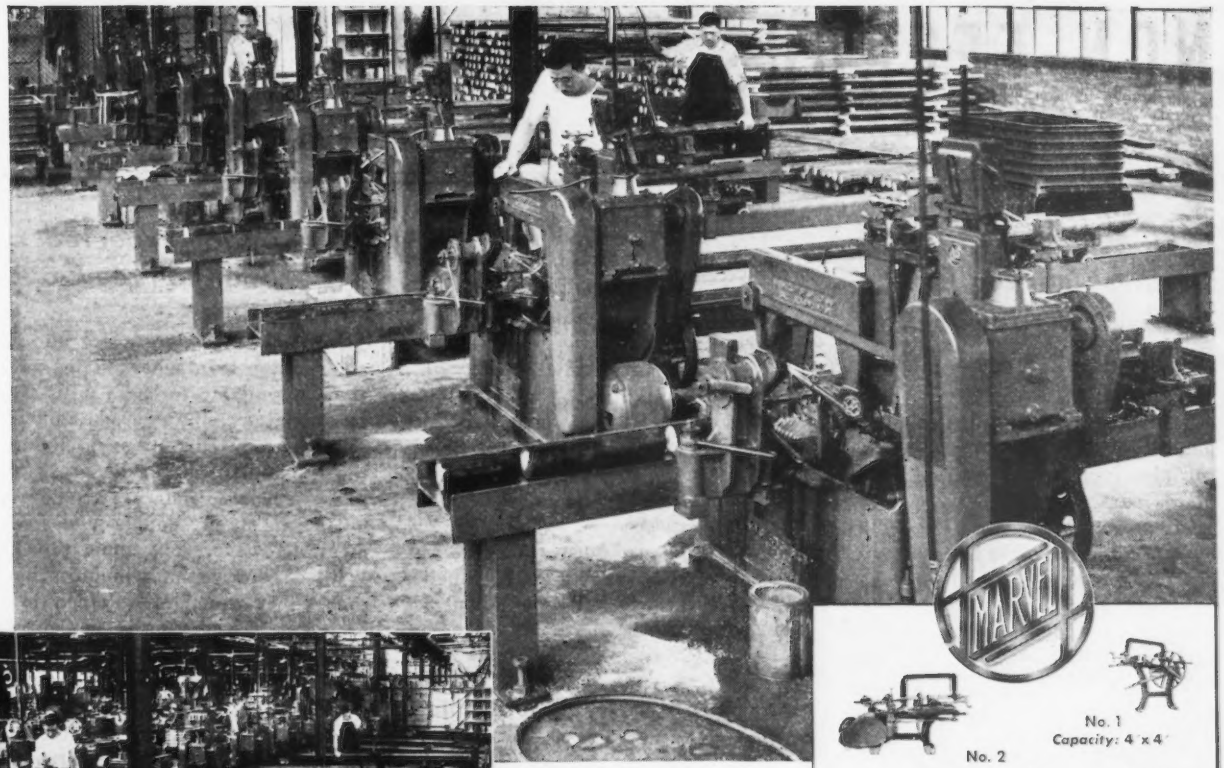
Mr. Gillette said that his recent resignation as chairman of the board was in accordance with his acceptance of the post on purely a temporary basis.

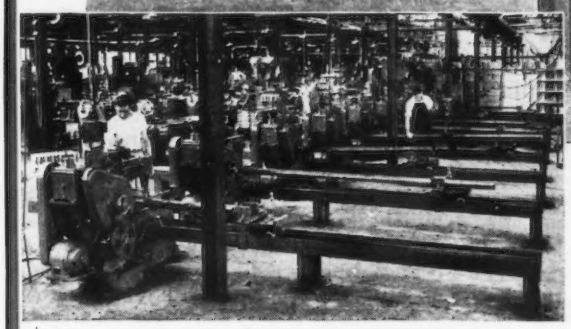
New Russian Orders Are Replacing Lend-Lease Contracts

Cincinnati

• • • With the opinion that war's end is not too far distant, machine tool builders are pressing for business to maintain operations into the peace period. Following the end of lend-lease to Russia, special selling on the part of some manufacturers brought additional business from Russia, while other orders are also reported from domestic sources.

By and large, the market is not appreciably changed from its condition of a week ago. War business is still keeping production at a good level and unless cutbacks come too heavy, backlogs will carry into the third quarter and conversion business will carry the rest of the year. Some builders indicate bookings that will carry into the spring of next year. While the labor supply is still none too plentiful the stringency does not appear to be too harsh at this time.





Wayne Pump has a modern "automatic" cutting-off department

Here is an efficient cutting-off department—a battery of nine high-speed No. 9A MARVEL Automatic Bar Feed Hack Saw Machines, which are supplied from an adjacent stock pile by an overhead monorail system. These MARVEL "Automatics" have been continuously cutting-off accurate lengths from 3⅛" and 3 3/16" diameter bars (WD 4150 M hot rolled steel) since 1942. With only 3 operators this "automatic" cut-off department has been able to keep ahead of not only the Wayne's large ordnance contracts but their various subcontract jobs as well.

Under this continuous "pounding," at wartime speed, these "world's fastest" hack saws have proven "practically trouble free." Day in and day out for over three years they have continued to automatically feed, measure, and accurately cut-off endless numbers of pieces from single or nested bars, tubes and shapes with no more operator attention, than is required by automatic screw machines.

MARVEL Automatic Production Saws come in two sizes, the No. 6A MARVEL, capacity 6" x 6", and the No. 9A MARVEL (pictured above) which has a capacity of 10" x 10". For larger size work the new MARVEL "Giant Hydraulic Hack Saws (capacities 18" x 18" and 24" x 24") are the first choice because they easily handle the largest sizes and toughest steels.

For quick reference see our section in Sweet's File, Mechanical Industries, or write for catalog

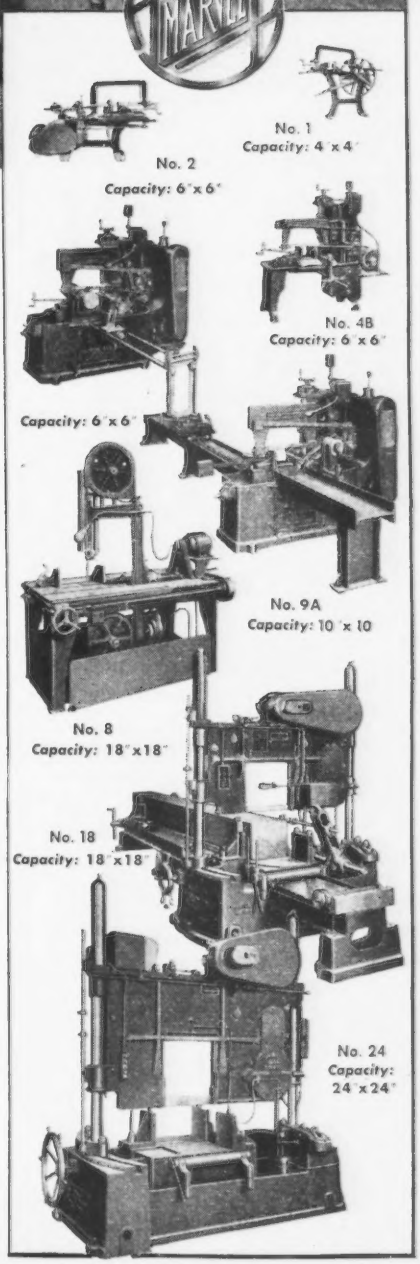
ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 BLOOMINGDALE AVE. CHICAGO 39, U. S. A.

Eastern Sales Office: 225 Lafayette St., New York 12, New York

MARVEL SAWS



NON-FERROUS METALS

. . . News and Market Activities

WPB Limits Quantity Of Authorized Orders For Aluminum Uses

Washington

• • • Direction 7 to CMP regulation 4 has been issued by WPB to limit the quantity of authorized material orders for aluminum that distributors may place, marking a switch from the previous policy by which aluminum-magnesium numbers could be used to purchase aluminum without limit as to quantity.

This action was taken in anticipation of the receipt of unrated orders by aluminum distributors after July 1, when CMP will be "open ended."

Under the new direction AM numbers in the series 9500 through 9599 are treated as authorized controlled material orders and AM numbers in the series 9600 through 9699 are treated as deferred orders.

Distributors may continue to place deferred orders, bearing a number in the 9600 series without limit as to quantity but distributors who have been assigned a number in the AM 9500 series must endorse all orders placed with producers or other distributors.

The procedure for a distributor requires that he use his individually assigned AM number in the 9500 series to the extent that the total amount of aluminum he wishes to order for delivery in the 1945 third or any subsequent quarter does not exceed the amount he delivered in the preceding calendar quarter on authorized controlled materials orders. These orders include deferred Z orders or any others that he has been directed by WPB to fill.

In endorsing orders for aluminum in excess of the foregoing quantities, an aluminum distributor must not use his individually assigned AM number in the 9500 series, but, must use the number AM 9600 instead.

•

Zinc Workers Get Increase

LaSalle, Ill.

• • • A 3c. hourly general wage increase has been ordered for all employees of Mathiessen & Hegeler Zinc Co., retroactive to Feb. 1, 1944, by the Sixth Regional War Labor Board. About 550 workers, represented by the Mine, Mill & Smelter Workers, local 80 (CIO) are involved.

The Board also has ordered a 3c. hourly general wage increase at Hegeler Zinc Co., Danville, Ill., with a 4c. hourly nightshift bonus on the second shift and 6c. on the third shift, with time and a half for work on six designated holidays. Union requests for severance pay and sick leave were denied. Retroactivity to June 1, 1944, was designated. The workers are represented by Mine, Mill & Smelter Workers, local 209 (CIO). About 800 are involved.

•

To Prefabricate 50,000 Homes

London

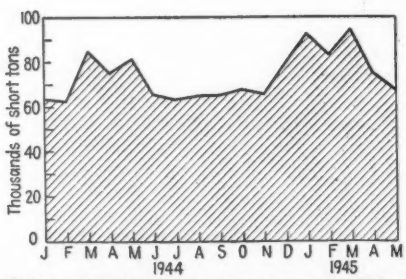
• • • The British aircraft industry is reported to be ready to begin production this year of 50,000 prefabricated aluminum houses. On exhibition here, the first full-scale model represents two years of research and is said to be the most highly prefabricated house produced in this country. The projected production schedule calls for 5000 per month.

•

Shortages Will Delay Civilian Cast Bronzes

New York

• • • In view of the likelihood of the availability of copper in the near future for civilian production, WPB has pointed out that the use of tin, cadmium and nickel remain in short supply and must continue to limit use of brass and bronze foundry production containing these metals to military and essential civilian requirements as authorized by the controlling orders.



ZINC SHIPMENTS: *Decline to* 66,982 *net tons in May.*

WPB Action Expected Soon to Free Copper

New York

• • • Copper producers are uncertain about their legal position in making copper available to brass mills to accommodate civilian production contemplated by current open-ending of the CMP plan as far as brass mills are concerned. Producers are now permitted to supply copper under allotment. However, it is understood that WPB is working on a modification of the copper order M-9, which is expected to be ready early in the week.

It has been announced by WPB that monthly military requirements for brass strip is dropping to 160 million lb. from a peak of 412 million lb. at the end of last year. March brass mill production was 334.25 million lb. A further drop in requirements to 145 million lb. is expected.

Requirements of the Army and Navy for brass rod have dropped from 65 million lb. a month to 33 million lb. WPB estimates that peak monthly rod requirements will be 75 million lb., compared with production of 110 million lb. in March and estimated demand of 134 million lb. at the end of last year. These reductions will be offset to some extent by projected doubling of warehouse allotments by WPB.

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Aluminum Sheets Cut; Extrusions to Follow

Washington

• • • Aluminum cutbacks have been filed with the aluminum industry as a result of curtailment in the aircraft program. The cutbacks are expected to be largest in sheets, approximating 30 per cent of total production, but these have been spread out to take effect in July and August. While cutbacks in aluminum extrusions have not yet been made, it is probable that they will follow in several months, after prime contractors for aircraft are able to work out their requirements.

Orders for civilian aluminum sheets are said to be building up as the result of impending open-ending of CMP. However, it is said the industry has no false hopes that civilian orders will absorb full military production capacity.

Primary Metals

(Cents per lb., unless otherwise noted)

Aluminum, 99+%, del'd (Min. 10,000 lb.)	15.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb. contained Be	$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb.)	$1.50 to $1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.9%, dollars per troy oz.	$4.00
Iridium, dollars per troy oz.	$120.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb. flask, f.o.b. New York	$150.00 to $155.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb. unless otherwise noted)

Aluminum, No. 12 Fdy. (No. 2)	9.00 to 10.00
Aluminum, deoxidizing No. 2, 3, 4	$6.00 to 9.50
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 105)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.37	....	20.37
Copper, H.R.	....	17.37	....
Copper drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52s, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals; ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 34c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NONFERROUS SCRAP METAL QUOTATIONS

†*(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)*

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.00
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25
Automobile radiators	7.00
Zincy bronze borings	8.00
Zincy bronze solids	8.00

OPA Group 3†

Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]

OPA Group 4†

Refinery brass	4.75*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.375
Loose Yellow Brass Trimmings	7.375

Aluminum

Plant scrap, segregated

2S solids	8.00
Dural alloys, solids 14, 17, 18, 24S	
25S	4.50
turnings, dry basis	3.00
Low copper alloys 51, 52, 61, 63S solids	7.50
turnings, dry basis	5.75

Plant scrap, mixed

Solids	4.00
Turnings, dry basis	2.75

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	6.00
Old castings and forgings	5.00
Pistons, free of struts	5.00
Pistons, with struts	3.00
Old alloy sheet	5.00

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	25⅛
Electrodeposited	13⅞
Rolled, oval, straight	19⅛
Curved	20⅜
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	23⅝
Zinc, cast, 99.99, 15 in. or longer	16¼
Nickel, 99 per cent plus, frt. allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 1-9 troy oz., per oz.	58*

Chemicals

(Cents per lb., f.o.b. shipping point)

Copper cyanide, 1-5 bbls.	34.00
Copper sulphate, 99.5, crystals, bbls.	7.75
Nickel salts, single, 425 lb. bbls., frt. allowed	13.50
Silver cyanide, 100 oz. lots	—.4179
Sodium cyanide, 96 per cent, domestic, 100 lb. drums	15.00
Zinc cyanide, 100 lb. drums	33.00
Zinc sulphate, 89 per cent, crystals, bbls., frt. allowed	6.35

*Price based on use of foreign silver.

SCRAP

. . . News and Market Activities

Market Strengthens Some This Week

New York

• • • While there is little evidence price-wise of a strengthened market this week, there are growing indications all over the country of firmness. Shoveling turnings have improved in price in Chicago, Buffalo, Boston and New York. This is an indication that other grades of turnings are not freely available. This has been predictable in recent weeks as turnings prices have appreciated in market after market.

Current reports, coupled with last week's report of the Bureau of Mines, on slowly vanishing inventories of consumers' stocks of purchased scrap, indicate that mills are buying for immediate delivery. Pittsburgh reports a large eastern buyer whose offers were formerly below ceiling has now returned to an offer of ceiling prices. This compares with the report from Buffalo of the breaking of the deadlock when the leading consumer placed orders for 15,000 to 20,000 tons without brokerage fees or springboard. Boston reports the return of all open hearth grades to ceilings and a corresponding improvement in blast furnace grades.

•

PITTSBURGH — The market here seems a little stronger on the demand side, especially in the heavier grades. No price weaknesses are indicated, and this apparently is becoming general with the report that one large eastern buyer that has been offering under-ceiling prices is now going back to the ceiling. One company in this area bought heavy scrap on the river at $20 without the springboard, but this is usual practice since the river delivery wouldn't necessarily carry the springboard. Long and short, alloy free machine shop turnings prices still range about $1.00 above the machine shop turnings range of $12.00 to $12.50.

•

CHICAGO—Mill purchasing continues to be for immediate requirements with quick delivery specified. Small tonnage transactions dominated the market last week, reflecting fluctuating prices for secondary open hearth and for blast furnace grades. Broad ranges previously quoted for machine shop turnings and bundled machine shop turnings are dropped this week to the lower portion of the range upon the basis of most recent mill sales. Broker buying to fulfill previous commitments and spot demand may see some at higher figures however. With a mill purchase of short shoveling turnings at $13.50, blast furnace grades are strong.

DETROIT—Little change is being reflected in this market, with shipments from dealer yards still good, aided by the weather, while movement from factories continues to slow down because of cutbacks. Short turnings are in good demand, while machine shop grades remain weak. Some weakness is being noted in electric furnace scrap, with most grades going to dealers definitely below ceiling, although choice low phos plate is getting the top price.

•

BUFFALO—The deadlock in the local market was broken late last week as the leading consumer placed orders for an estimated 15,000 to 20,000 tons of assorted scrap. The contracts were reported to make no allowances for brokerage fees, springboards or the 3 per cent transportation tax. Heavy melting steel brought ceiling prices, and machine shop turnings were unchanged at $11, but short shovelings strengthened 50c. to $1 a ton at $14 flat. Three thousand tons of scrap from the seaboard arrived by canal and another 2000 tons is due this week, but the Lake movement was zero.

•

CLEVELAND — Although one large consumer is out of the market, there have been no important changes here. The market is steady, with brokers able to sell just about everything they can buy except electric furnace grades, a lot of which is being offered. Mills are paying ceiling for electric furnace, but no springboard. Turnings are slowly tightening up, with indications that they will be a good deal tighter after the next munitions cut, assuming that operations remain the same. One sale of turnings, brought in by boat, was reported at $15.50, but the tonnage involved was not large.

•

BOSTON—Heavy material prices have reversed themselves and are back at ceilings. Real feature of market, however, is a jump in demand and prices for shoveling turnings, now generally quoted at $10 a ton. The spread between them and machine shop turnings is now $4 a ton, contrasted with the OPA spread of $2. Shop turnings and mixed borings and turnings have recovered 50c. a ton. Low phos and cast material is moving to foundries more freely at ceilings.

•

PHILADELPHIA—In spite of the fact that prices here continue unchanged, there appears to be a strengthening of the market. It is common belief that there is little or no chance of prices dropping below current levels for some time since the heavy tonnages being shipped from the East to Pittsburgh will continue for several weeks while brokers clear up shipments against orders already placed.

NEW YORK—Movement of scrap has slowed down but brokers are hopeful that the pressure of requirements may cause mills to renew ordering before current contracts expire at the end of June. Scrap prices remain the same, but this is nominal since transactions have not been made. Scrap is said not to be coming out in volume and there would seem to be little tendency for a break in the market to develop at this time. It is reported that certain brokers here are nevertheless maintaining a short position in the market.

•

ST. LOUIS—Shipments of scrap iron to the St. Louis industrial district continue to fall as a result of shortage of manpower, bad weather, and less material available, plus the allocation for the last two weeks of scrap to the Chicago mills from St. Louis territory. However, district mills have sufficient piles for the next five to six weeks, and are uncomplaining.

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CINCINNATI — The market remains quiet. Consumers show no great disposition to purchase material, since they appear to have reasonably adequate inventories. Of course, material continues to move on old commitments. Brokers are tending to shun too long a position, which is being made possible by a rather plentiful amount of most grades of material, except the cast grades, so that caution seems to be their watchword.

•

BIRMINGHAM — Demand here for open hearth grades has declined further with mills limiting their orders to small tonnages and declining to extend date of delivery beyond 30 days. Considerable interest is being shown, however, for blast furnace material and scrap prices, generally, are currently firm.

•

SAN FRANCISCO—After less than a month at ceiling, scrap at San Francisco has dropped 50c. on No. 1 and RR heavy melting grades, and $1.00 on No. 2, to re-establish the grade differentials. Present market is still $1.00 a ton above the base before the artificial jump of four weeks ago.

Brokerage Firm Opens

Chicago

• • • Formation of the Max Schlossberg Co. to act as brokers of scrap iron and steel and to deal in surplus materials has been announced by Max Schlossberg and Harold Brady, partners in the new firm. Mr. Schlossberg has been associated with the M. S. Kaplan Co. for the past 13 years, serving as vice-president for ten, and previously was with Price Iron & Steel Co. for six years.

IRON AND STEEL SCRAP PRICES

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages (for ceiling prices see O. P. A. schedule No. 4). Where ceiling prices are quoted they do not include brokerage fee or adjusted transportation charges. Asterisks indicate grades selling at ceilings.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bdld. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	$12.00 to 12.50
Short shov. turn.	15.50 to 16.00
Mixed bor. and turn.	12.00 to 12.50
Cast iron borings	14.50 to 15.00
Hvy. break. cast.	16.50*
No. 1 cupola	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Rolled steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	18.75*
Bundled mach. shop turn.	$16.25 to 16.75
Galv. bundles	14.25 to 14.75
Mach. shop turn.	11.00 to 11.50
Short shovel. turn.	13.00 to 13.50
Cast iron borings	12.00 to 12.50
Mix. borings & turn.	12.00 to 12.50
Low phos. hvy. forge	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Rails 3 ft. and under	22.25*
Locomotive tires, cut	22.50 to 23.00
Cut bolsters & side frames	19.75 to 20.25
Angles & Splice bars	22.25*
Standard stl. car axles	23.50 to 24.00
No. 3 steel wheels	22.00 to 22.50
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast.	20.00*
No. 1 agricul. cast.	20.00*
Hvy. breakable cast	16.50*
RR. grate bars	15.25*
Cast iron brake shoes	15.25*
Stove plate	19.00*
Clean auto cast	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 2 bundles	19.50*
Mach. shop turn.	$7.00 to 7.50
Shoveling turn.	8.00 to 8.50
Cast iron borings	8.00 to 8.50
Mixed bor. & turn.	7.00 to 7.50
Low phos. plate	22.00*
No. 1 cupola cast.	20.00*
Hvy. breakable cast	16.50*
Stove plate	19.00*
Scrap rails	21.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$15.05*
No. 2 hvy. melting	15.05*
No. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovelings	10.00
Machine shop turn.	6.00
Mixed bor. & turn.	6.00
Cl'n cast, chem. bor.	$13.06 to 14.15*

Truck delivery to foundry

Machinery cast	21.00 to 23.51*
Breakable cast	21.57 to 21.87*
Stove plate	20.00 to 23.51*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	$6.75 to 7.25
Short shov. turn.	10.75 to 11.25
Cast iron borings	9.75 to 10.75
Mixed bor. & turn.	7.00 to 7.50
Low phos. plate	19.00 to 19.82
No. 1 cupola cast	20.00*
Charging box cast	18.00 to 19.00
Hvy. breakable cast	16.50*
Stove plate	18.50 to 19.00
Automotive cast	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.75 to 18.25
No. 2 hvy. melting	17.75 to 18.25
No. 2 bundles	15.75 to 16.25
Mach. shop turn.	9.00 to 9.50
Shoveling turn.	10.50 to 11.50
Cast iron borings	11.00 to 11.50
Mixed bor. & turn.	9.00 to 9.50
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Cast, charging box	19.00*
Hvy. axle, forge turn.	17.00 to 17.50
Low phos. plate	20.25 to 21.25
Low phos. punchings	20.25 to 21.25
Billet crops	20.25 to 21.25
RR. steel wheels	23.25*
RR. coil springs	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting	$17.50*
Bundled sheets	17.50*
Mach. shop turn.	7.00
Hvy. axle turn.	10.00
Locomotive tires, uncut	17.00
Misc. std. sec. rails	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft. and under	21.50*
RR. springs	22.00*
Steel car axles	23.50*
Stove plate	19.00*
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.00*
Cast iron carwheels	20.00*
No. 1 mach'ery cast	20.00*
Breakable cast	16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00*
No. 2 hvy. melting	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	$9.50 to 10.00
Cast iron borings	9.50 to 10.00
Bar crops and plate	19.50*
Structural and plate	19.50*
No. 1 cast	20.00*
Stove plate	17.00
Steel axles	18.00*
Scrap rails	18.50
Rerolling rails	20.50*
Angles & splice bars	20.50*
Rails 3 ft. & under	21.00*
Cast iron carwheels	16.50 to 17.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop turn.	$11.50 to 12.00
Short shovel. turn.	15.00 to 15.50
Cast iron borings	14.00 to 14.50

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$14.83 to $15.17
No. 2 hvy. melting	14.83 to 15.17
Comp. black bundles	12.33 to 14.67
Comp. galv. bundles	10.33 to 12.67
Mach. shop turn.	6.50
Mixed bor. & turn.	6.50
Shoveling turn.	925 to 9.75
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Charging box cast	19.00*
Stove plate	19.00*
Clean auto cast	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	11.00
Shoveling turn.	14.00
Cast iron borings	12.00
Mixed bor. & turn.	11.00
No. 1 cupola cast	20.00*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00*
No. 2 bundles	19.50*
Mach. shop turn.	$10.00 to 10.50
Short shovel.	14.00 to 14.50
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	13.00 to 13.50
Mixed bor. & turn.	12.00 to 12.50
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting	$16.50
No. 1 hvy. melting	16.50
No. 2 hvy. melting	15.00
No. 2 bales	$13.50 to 14.25
No. 3 bales	9.50 to 10.59
Mach. shop turn.	7.00
Elec. furn. 1 ft., und.	15.50 to 17.00
No. 1 cupola cast	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$14.50 to $15.50
No. 2 hvy. melting	13.50 to 14.50
No. 2 bales	12.50 to 13.50
No. 3 bales	9.00 to 10.00
Mach. shop turn.	4.50
No. 1 cupola cast	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	$14.50
No. 1 hvy. melting	14.50*
No. 3 bundles	11.50
Elec. furn. 1 ft., und.	17.00
No. 1 cupola cast	20.00*

Comparison of Prices . .

Advances Over Past Week in Heavy Type; Declines in *Italics*. Prices are F.O.B. Major Basing Points. The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 162-171.

Flat Rolled Steel (Cents Per Lb.)	June 12, 1945	June 5, 1945	May 8, 1945	June 13, 1944
Hot rolled sheets	2.20	2.20	2.20	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.70	3.70	3.65	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.25	2.25	2.20	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.25	2.25	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Bright wire	2.75	2.75	2.60	2.60
Wire nails	2.90	2.90	2.80	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$43.00	$43.00	$43.00	$40.00
Light rails	45.00	45.00	43.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$36.00	$36.00	$34.00	$34.00
Sheet bars	36.00	36.00	34.00	34.00
Slabs, rerolling	36.00	36.00	34.00	34.00
Forging billets	42.00	42.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.15	2.15	2.00	2.00
Skelp	1.90	1.90	1.90	1.90

Latest steel price increase, Amendment 13 to RPS6, effective May 23, 1945.

Pig Iron: (Per Gross Ton)	June 12, 1945	Jupne 5, 1945	May 8, 1945	June 13, 1944
No. 2 fdy., Philadelphia	$26.84	$26.84	$26.84	$25.84
No. 2, Valley furnace	25.00	25.00	25.00	24.00
No. 2, Southern, Cin'ti	26.11	26.11	26.11	25.11
No. 2, Birmingham	21.38	21.38	21.38	20.38
No. 2, foundry, Chicago†	25.00	25.00	25.00	24.00
Basic, del'd eastern Pa.	26.34	26.34	26.34	25.34
Basic, Valley furnace	24.50	24.50	24.50	23.50
Malleable, Chicago†	25.00	25.00	25.00	24.00
Malleable, Valley	25.00	25.00	25.00	24.00
L. S. charcoal, Chicago*	42.34	42.34	42.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

‡ For carlots at seaboard.

Last pig iron price change authorized by OPA effective Feb. 14, 1945.

* Charcoal price increase retroactive to March 7, on contracts to Feb. 13.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$26.00
Heavy melt'g steel, Phila.	18.00	18.00	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.50	$7.00	$7.00	$7.00
Foundry coke, prompt	9.00	8.25	8.25	8.25
Non-Ferrous Metals: (Cents Per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

Composite Prices . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
June 12, 1945	2.41571c. a Lb.	$24.61 a Gross Ton	$18.92 a Gross Ton
One week ago	2.41571c. a Lb.	$24.61 a Gross Ton	$18.92 a Gross Ton
One month ago	2.38444c. a Lb.	$24.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.30329c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1945	2.41571c., May 29	2.21189c., Jan. 2	$24.61, Feb. 20	$23.61, Jan. 2	$19.17	$19.17
1944	2.30837c., Sept. 5	2.21189c., Oct. 5	$23.61	$23.61	19.17	$15.67, Oct. 24
1943	2.25513c.	2.25513c.	23.61	23.61	19.17	19.17
1942	2.26190c.	2.26190c.	23.61	23.61	19.17	19.17
1941	2.43078c.	2.43078c.	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c. Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Roll Grinding with Cortland Wheels

What's so wonderful about roll grinding? Cortland believes that there is *one* combination of grain, grade, structure, etc., necessary to produce that perfect balance between wheel *work* and wheel *wear* that means satisfactory production for the roll grinder . . . and a satisfied repeat customer for Cortland.

If you want an experienced close-up on a grinding problem for economical postwar production . . . come to Cortland.

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CORTLAND GRINDING WHEELS CORPORATION • CHESTER, MASSACHUSETTS

Photograph Courtesy of MacIntosh-Hemphill Co., Pittsburgh, Pa. Drawing made from photo in which wheel was hidden by a guard.

Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb. unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes, 25c. above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price for annealed, bright finish wires, commercial spring wire. (15) Produced to dimensional tolerances in AISI Manual Sect. 6. For price exceptions to finished and semi-finished steels turn two pages.

Basing Point / Product	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.30¢	2.20¢		2.75¢	2.30¢	2.44¢	2.37¢
Cold rolled [1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 gage)	3.70¢	3.70¢	3.70¢		3.70¢	3.70¢	3.70¢	3.70¢	3.80¢	3.70¢		4.25¢		3.94¢	3.87¢
Enameling (20 gage)	3.45¢	3.45¢	3.45¢	3.45¢			3.45¢		3.55¢	3.45¢		4.10¢	3.55¢	3.81¢	3.77¢
Long ternes [2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
STRIP															
Hot rolled [3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold rolled [4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester=3.00¢)					2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester=3.35¢)					3.05¢	3.31¢	
TIN PLATE															
Standard cokes, base box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
Electro, box 0.25 lb.	$4.35	$4.35	$4.35												
Electro, box 0.50 lb.	$4.50	$4.50	$4.50						$4.60						
Electro, box 0.75 lb.	$4.65		$4.65						$4.75						
BLACK PLATE															
29 gage [5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[13]			3.37¢
TERNES, MFG.															
Special coated, base box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢		(Duluth=2.35¢)			2.60¢	2.90¢	2.35¢	2.59¢	2.57¢
Rail steel [6]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢					2.60¢	2.90¢			
Reinforcing (billet) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (rail) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢[13]	2.25¢		2.47¢
Cold finished [8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit=2.70¢)			(Toledo=2.80¢)			2.99¢	2.97¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Massillon, Canton=2.70¢)					2.80¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
PLATES								(Coatesville and Claymont=2.25¢)							
Carbon steel [15]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢		2.25¢	2.25¢	2.50¢		2.60¢	2.80¢	2.47¢	2.44¢	2.30¢
Floor plates	3.50¢	3.50¢									3.85¢	4.15¢		3.86¢	3.82¢
Alloy	3.50¢	3.50¢			(Coatesville=3.50¢)						3.95¢	4.15¢		3.70¢	3.50¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem=2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester=3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester=4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester=6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester=8.55¢)								
WIRE [9]															
Bright [14]	2.75¢	2.75¢		2.75¢	2.75¢		(Worcester=2.85¢)			(Duluth=2.80¢)		3.25¢			3.07¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire base														
Spring (High Carbon)	3.35¢	3.35¢		3.35¢			(Worcester=3.45¢)					3.85¢			3.67¢
PILING															
Steel Sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... $31.00

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Provo, $11.20 higher. Delivered prices do not reflect three per cent tax on freight rates.

Per Gross Ton

Rerolling $36.00
Forging quality 42.00

Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem, per gross ton $54.00

Price delivered Detroit $2.00 higher; East Michigan, $3.00 higher.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

Per Gross Ton

Open hearth or bessemer $36.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.15c.
Worcester, Mass.	2.25c.
Birmingham	2.15c.
San Francisco	2.65c.
Galveston	2.40c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; East Michigan, $3 higher.

Price Exceptions: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$43.00
Angle splice bars, 100 lb.	2.70
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$45.00
Light rails (from rail steel)	44.00
	Base per Lb.
Cut spikes	3.25c.
Screw spikes	5.40c.
Tie plate, steel	2.30c.
Tie plates, Pacific Coast	2.45c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	62-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	*Pacific Coast Basing Points†*
	Base per Keg	
Standard wire nails	$2.90	$3.40
Coated nails	2.90	3.40
Cut nails, carloads	3.85	....
	Base per 100 Lb.	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	Base Column	
Woven wire fence*	67	35
Fence posts, carloads	69	86
Single loop bale ties	66	91
Galvanized barbed wire**	**72**	**82**
Twisted barbless wire	72	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.
†Prices subject to switching or transportation charges.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	$3.518	$4.872[6]	$5.158a	$3.922	$4.772	$3.605	$3.666	$3.822	$4.072	$5.966	$7.066	$7.272	$8.322
New York	3.59	4.813[3]	5.110	3.974[6]	4.772	3.768	3.758	3.853	4.103	5.858	6.908	7.103	8.203
Boston	3.744	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.056	6.85	7.90
Buffalo	3.35	4.40	4.754	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.45	4.50	5.004	3.70	4.689[17]	3.609	3.661	3.45	3.80	6.08	7.18	7.159	8.209
Cincinnati	3.425	4.475[2]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.347[2]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul	3.51	4.48	5.257[4]	3.88	4.35[17]	3.811[3]	3.811[3]	3.761[3]	4.361	6.09	7.19	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.43	....	....	....	....
Indianapolis	3.518	4.568	4.548	3.768	4.741	3.63	3.63	3.58	3.98	6.08	7.18	7.18	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.965[7]	4.66	3.265	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	4.95	5.358	4.308	....	4.158	4.158*	4.108*	4.629	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	4.10	7.20[3]	6.10[4]	4.95	6.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.33[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.80[4]	5.75[4]	4.75[11]	....	4.85[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.530[17]	....	6.171[3]	5.53[17]	....	4.98[17]	4.98[17]	4.98[17]	5.90	....	....	....	....

National Emergency Steels

MILL EXTRAS

Designation	Basic Open-Hearth		Electric Furnace		Designation	Basic Open-Hearth		Electric Furnace	
	Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs		Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs
NE 8612	0.65¢	$13.00	$1.15	$23.00	NE 9427	0.75¢	$15.00	$1.25	$25.00
NE 8615	0.65	13.00	1.15	23.00	NE 9430	0.75	15.00	1.25	25.00
NE 8617	0.65	13.00	1.15	23.00	NE 9432	0.75	15.00	1.25	25.00
NE 8620	0.65	13.00	1.15	23.00	NE 9435	0.75	15.00	1.25	25.00
NE 8622	0.65	13.00	1.15	23.00	NE 9437	0.75	15.00	1.25	25.00
NE 8625	0.65	13.00	1.15	23.00	NE 9440	0.75	15.00	1.25	25.00
NE 8627	0.65	13.00	1.15	23.00	NE 9442	0.80	16.00	1.30	26.00
NE 8630	0.65	13.00	1.15	23.00	NE 9445	0.80	16.00	1.30	26.00
NE 8632	0.65	13.00	1.15	23.00	NE 9447	0.80	16.00	1.30	26.00
NE 8635	0.65	13.00	1.15	23.00	NE 9450	0.80	16.00	1.30	26.00
NE 8637	0.65	13.00	1.15	23.00					
NE 8640	0.65	13.00	1.15	23.00					
NE 8642	0.65	13.00	1.15	23.00	NE 9722	0.65	13.00	1.15	23.00
NE 8645	0.65	13.00	1.15	23.00	NE 9727	0.65	13.00	1.15	23.00
NE 8647	0.65	13.00	1.15	23.00	NE 9732	0.65	13.00	1.15	23.00
NE 8650	0.65	13.00	1.15	23.00	NE 9737	0.65	13.00	1.15	23.00
					NE 9742	0.65	13.00	1.15	23.00
					NE 9745	0.65	13.00	1.15	23.00
NE 8712	0.70	14.00	1.20	24.00	NE 9747	0.65	13.00	1.15	23.00
NE 8715	0.70	14.00	1.20	24.00	NE 9750	0.65	13.00	1.15	23.00
NE 8717	0.70	14.00	1.20	24.00	NE 9763	0.65	13.00	1.15	23.00
NE 8720	0.70	14.00	1.20	24.00	NE 9768	0.65	13.00	1.15	23.00
NE 8722	0.70	14.00	1.20	24.00					
NE 8725	0.70	14.00	1.20	24.00					
NE 8727	0.70	14.00	1.20	24.00	NE 9830	$1.30	26.00	1.80	36.00
NE 8730	0.70	14.00	1.20	24.00	NE 9832	1.30	26.00	1.80	36.00
NE 8732	0.70	14.00	1.20	24.00	NE 9935	1.30	26.00	1.80	36.00
NE 8735	0.70	14.00	1.20	24.00	NE 9837	1.30	26.00	1.80	36.00
NE 8737	0.70	14.00	1.20	24.00	NE 9840	1.30	26.00	1.80	36.00
NE 8740	0.70	14.00	1.20	24.00	NE 9842	1.30	26.00	1.80	36.00
NE 8742	0.70	14.00	1.20	24.00	NE 9845	1.30	26.00	1.80	36.00
NE 8745	0.70	14.00	1.20	24.00	NE 9847	1.30	26.00	1.80	36.00
NE 8747	0.70	14.00	1.20	24.00	NE 9850	1.30	26.00	1.80	36.00
NE 8750	0.70	14.00	1.20	24.00					
					NE 9912	1.20	24.00	1.55	31.00
NE 9415	0.75	15.00	1.25	25.00	NE 9915	1.20	24.00	1.55	31.00
NE 9417	0.75	15.00	1.25	25.00	NE 9917	1.20	24.00	1.55	31.00
NE 9420	0.75	15.00	1.25	25.00	NE 9920	1.20	24.00	1.55	31.00
NE 9422	0.75	15.00	1.25	25.00	NE 9922	1.20	24.00	1.55	31.00
NE 9425	0.75	15.00	1.25	25.00	NE 9925	1.20	24.00	1.55	31.00

Note 1: The ranges shown are restricted to sizes 100 sq. in. or less or equivalent cross-sectional area 18 in. wide or under, with a maximum individual piece weight of 7000 lb. irrespective of size. **Note 2:** For steels ordered to such ranges, below the size and weight restriction, the average of all the chemical checks must be within the limits specified subject to check analysis variations given in Table 4, Section 10, AISI Steel Products Manual. **Note 3:** When acid open-hearth is specified and acceptable, add to basic open-hearth alloy differential 0.25c. per lb. for bars and bar strip and $5 per gross ton for billets, blooms and slabs. **Note 4:** The extras shown are in addition to the base price of $2.70 for 100 lb. on finished products and $54 per gross ton on semi-finished steel, major basing points, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. The full extra applicable over the base price is the total of all extras indicated by the specific requirements of the order. The higher extra shall be charged for any size falling between two published extras.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 199 lb. (7) 400 to 1499 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 800 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(a) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

PRICES

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200.00 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
⅛ in.	24	3½
¼ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ in. and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron (Same as Above)		
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	23½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.10
6 in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	*Hot Rolled*	*Lap Weld, Hot Rolled*
2 in. o.d. 13 B.W.G.	15.03	13.04	12.32
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft. and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

PRICES

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis	$66.55
First quality, Pa., Md., Ky., Mo., Ill.	52.85
First quality, New Jersey	57.70
Sec. quality, Pa., Md., Ky., Mo., Ill.	47.95
Sec. quality, New Jersey	52.55
No. 1 Ohio	44.30
Ground fire clay, net ton	7.80

Silica Brick

Pennsylvania and Birmingham	$52.85
Chicago District	60.65
Silica cement, net ton (Eastern)	9.25

Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

EXCEPTIONS TO RPS 6

Ingots, carbon, rerolling—Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast ports; Empire Sheet & Tinplate Co., $34.25; Pgh. Steel Co., $33.10.

Ingots, carbon, forging—Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports; Pgh. Steel Co., $38.10.

Ingots, alloy—C/1 delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

Slabs, per gross ton—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel $47.50; Kaiser Co., (rerolling) $58.64, (forging) $64.64, f.o.b. Los Angeles.

Blooms, per gross ton—Phoenix Iron Co. (rerolling) $41; (forging) $47; Pgh. Steel Co. (rerolling) $38.25, (forging) $44.25; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth; Kaiser Co. (rerolling) $58.64, (forging) $64.64 (shell steel) $74.64 f.o.b. Los Angeles.

Sheet Bar, per gross ton—Empire Sheet & Tinplate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging, per gross ton—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto, Ohio; Phoenix Iron Co. $47 mill; Geneva Steel Co. $64.64 f.o.b. Pacific Coast; Pittsburgh Steel Co. $49.50; Kaiser Co. $64.64, (shell steel) $74.64, f.o.b. Los Angeles.

PRICES

Billets, Rerolling, per gross ton—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. 4 in. sq. or larger $37.75, smaller $39.50 f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.60 Birmingham; Ford Motor Co. $34 Dearborn, Mich.; Geneva Steel Co. $58.64 f.o.b. Pacific Coast; Pgh. Steel Co. $43.50; Kaiser Co. $58.64 f.o.b. Los Angeles.

Structural Shapes—Phoenix Iron Co. 2.35c. basing pts. (export) 2.50c. Phoenixville; Knoxville Iron Co. 2.30c. basing points; Kaiser Co. 3.20c. f.o.b. Los Angeles.

Rails, per gross ton—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron, $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. 2.65c. mill; Knoxville Iron Co. 2.25c. basing pts.; Kaiser Co. and Geneva Steel Co. 3.20c. Pacific Ports; Central Iron and Steel Co. 2.50c. basing points; Granite City Steel Co. 2.35c. Granite City.

Merchant Bars—W. Ames Co., 10 tons and over, 2.85c. mill; Eckels-Nye Steel Corp. 2.50c. basing pts. (rail steel) 2.40c.; Phoenix Iron Co. 2.40c. basing pts.; Sweet Steel Co. (rail steel) 2.33c. mill; Joslyn Mfg. & Supply Co., 2.35c. Chicago; Calumet Steel Div., Borg Warner Corp. (8 in. mill bar), 2.35c. Chicago; Knoxville Iron Co., 2.30c. basing pts.; Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.ob Madison, Ill.; Milton Mfg. Co., 2.75c. f.o.b. Milton, Pa.

Pipe Skelp—Wheeling Steel, Benwood, 2.05c.

Reinforcing Bars—W. Ames & Co., 10 tons and over, 2.85c. mill; Sweet Steel Co. (rail steel), 2.33c. mill; Columbia Steel Co., 2.50c. Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Mansfield, Mass., f.o.b. Mansfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants, f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass., f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co., for delivery except Texas and Okla., Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co., shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co., 2.30c. Chicago; Knoxville Iron Co., 2.25c. basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel, 2.25c. Parkersburg.

Galvanized Sheets—Andrews Steel Co. 3.75c. basing pts.; Parkersburg Iron & Steel Co., 3.85c. Parkersburg; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is 2.45c. per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

Wire Products—Pittsburgh Steel Co., f.o.b. Pittsburgh, per 100 lb., rods, No. 5 to 9/32 in., 2.20c.; rods, heavier than 9/32, 2.35c.; bright wire, 2.725c.; bright nails, 2.90c.; lead and furnace annealed wire, 2.85c.; pot annealed wire, 2.85c.; galvanized barbed wire, 3.90c.; plain staples, 2.55c.; galvanized staples, 2.65c.; bright spring wire, 3.30c.; galvanized spring wire, 3.45c.

PIG IRON PRICES

BASING POINT* BASE PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	$25.50	$26.00	$26.50	$27.00	.....
Birdsboro	25.50	26.00	26.50	27.00	$30.50
Birmingham	20.00	21.38	.....	26.00	.....
Buffalo	24.00	25.00	25.50	26.00	30.50
Chicago	24.50	25.00	25.00	25.50	.....
Cleveland	24.50	25.00	25.00	25.50	.....
Detroit	24.50	25.00	25.00	25.50	.....
Duluth	25.00	25.50	25.50	26.00	.....
Erie	24.50	25.00	25.50	26.00	.....
Everett	25.50	26.00	26.50	27.00	.....
Granite City	24.50	25.00	25.00	25.50	.....
Hamilton	24.50	25.00	25.00	.....	.....
Neville Island	24.50	25.00	25.00	25.50	.....
Provo	22.50	23.00	.....	.....	.....
Sharpsville (1)	24.50	25.00	25.00	25.50	.....
Sparrows Point	25.50	26.00	.....	.....	.....
Steelton	25.50	.....	.....	.....	30.50
Swedeland	25.50	26.00	26.50	27.00	.....
Toledo	24.50	25.00	25.00	25.50	.....
Youngstown	24.50	25.00	25.00	25.50	.....

DELIVERED PRICES† (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$ .50	$26.00	$26.50	$27.00	$27.50	.....
Boston	Birdsboro-Steelton	4.02	.....	.....	.....	.....	$34.52
Brooklyn	Bethlehem	2.50	28.00	28.50	29.00	29.50	.....
Brooklyn	Birdsboro	2.92	.....	.....	.....	.....	33.42
Canton	Cleveland	1.39	25.89	26.39	26.39	26.89	.....
Canton	Buffalo	3.19	.....	.....	.....	.....	33.69
Cincinnati	Birmingham	4.06	24.06	25.44	.....	.....	.....
Cincinnati	Hamilton	1.11	.....	.....	26.11	.....	34.90
Cincinnati	Buffalo	4.40	.....	.....	.....	.....	.....
Jersey City	Bethlehem	1.53	27.03	27.53	28.03	28.53	.....
Jersey City	Birdsboro	1.94	.....	.....	.....	.....	32.44
Los Angeles	Provo	4.95	27.45	27.95	.....	.....	.....
Los Angeles	Buffalo	15.41	.....	.....	.....	.....	45.91
Mansfield	Cleveland & Toledo	1.94	26.44	26.94	26.94	27.44	.....
Mansfield	Buffalo	3.36	.....	.....	.....	.....	33.86
Philadelphia	Swedeland	.84	26.34	26.84	27.34	27.84	.....
Philadelphia	Birdsboro	1.24	.....	.....	.....	.....	31.74
San Francisco	Provo	4.95	27.45	27.95	.....	.....	.....
San Francisco	Buffalo	15.41	.....	.....	.....	.....	45.91
Seattle	Provo	4.95	27.45	27.95	.....	.....	.....
Seattle	Buffalo	15.41	.....	.....	.....	.....	45.91
St. Louis	Granite City	.50	25.00	25.50	25.50	26.00	.....
St. Louis	Buffalo	7.07	.....	.....	.....	.....	37.57

* Maximum per gross ton, established by OPA February 14, 1945. † Prices do not reflect 3 per cent tax on freight.

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, $33.00 and $34.00, respectively. Newberry Brand of Lake Superior charcoal iron $39.00 per g.t., f.o.b. furnace, by order L 39 to RPS 10, April 11, 1945, retroactive to March 7, 1945. Delivered to Chicago, $42.34. High phosphorus iron sells at Lyles, Tenn., at $28.50.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

Silvery iron and bessemer ferrosilicon up to and including 14.00 per cent silicon covered by RPS 10 as amended Feb. 14, 1945. Silvery iron, silicon 6.00 to 6.50 per cent, C/L per G.T., f.o.b. Jackon, Ohio—$30.50; f.o.b. Buffalo—$31.75. Add $1.00 per ton for each additional 0.50% Si. Add 50c. per ton for each 0.50% Mn over 1.00%. Add $1.00 per ton for 0.75% or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

Copper, electrolytic, 150 and 200 mesh	21½ to 23½c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh 96 + % Fe	12½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe, carload lots	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots	63c.
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh	11½ to 12½c.
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh	8½c. plus metal
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	$7.50*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	9.00
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.88
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.85
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge $8.00 per ton plus transportation charges.

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

Base discount less case lots

	Per Cent Off List
3/16 & 5/16 in. x 6 in. & shorter	63½
½ in. & smaller x 6 in. & shorter	65½
¾ to 1 in. x 6 in. & shorter	61
1½ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	**U.S.S.**	**S.A.E.**
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
⅝ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 per cent additional discount.

Stove Bolts

	Consumer
Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 35c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws	*Consumer Per Cent Off List*
Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
3-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.30c.
Armature	3.65c.
Electrical	4.15c.
Motor	5.05c.
Dynamo	5.75c.
Transformer 72	6.25c.
Transformer 65	7.25c.
Transformer 58	7.75c.
Transformer 52	8.55c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	141.00
Less ton lots (packed)	148.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	36c.
L.c.l. lots	38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.

Carload, bulk	34c.
L.c.l. lots	35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carloads, f.o.b. shipping point with freight allowed.

	Eastern Zone	Central Zone	Western Zone
50% Si	6.65c.	7.10c.	7.25c.
75% Si	8.05c.	8.20c.	8.75c.
80-90% Si.	8.90c.	9.05c.	9.55c.
90-95% Si.	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

Silvery Iron, Silicon 14.01 to 14.50 per cent, $45.50 per G. T. f.o.b. Jackson, Ohio. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%. Covered by MPR 405.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe..	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe..	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk.	3.35c.	3.50c.	3.65c.
2000 lb-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.30c.
2000 lb. to carload	6.30c.
Less ton lots	6.55c.

Ferrochrome

(65-72% Cr. 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10%	13.00c.	13.40c.	14.00c.
62-66% Cr, 5-7% C	13.50c.	13.90c.	14.50c.

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2c. per lb. to regular low-carbon ferrochrome price schedule. Add 2c. for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5c. per lb. to regular high-carbon ferrochrome price schedule.

Low-Carbon Ferromanganese

Contract prices per lb. of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, Eastern Zone. Add 0.25c. for spot sales.

	Carloads, Ton Bulk	Lots	Less Ton
0.10% max. C, 1 or 2% max. Si..	23.00c.	23.40c.	23.65c.
0.15% max. C, 1 or 2% max. Si..	22.00c.	22.40c.	22.65c.
0.30% max. C, 1 or 2% max. Si..	21.00c.	21.40c.	21.65c.
0.50% max. C, 1 or 2% max. Si..	20.00c.	20.40c.	20.65c.
0.75% max. C, 7.00% max. Si..	16.00c.	16.40c.	16.65c.

Ferrochrome Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60 per cent contained chromium. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk..	8.25c.	8.55c.	8.95c.
Ton lots	8.75c.	9.25c.	10.75c.
Less ton lots..	9.00c.	9.50c.	11.00c.

Ferromanganese Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66 per cent contained manganese. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk..	6.05c.	6.30c.	6.60c.
Ton lots	6.65c.	7.55c.	8.55c.
Less ton lots..	6.80c.	7.80c.	8.80c.

Calcium—Manganese—Silicon

Contract prices per lb. of alloy, lump size, f.o.b. shipping point, freight allowed to destination.

16-20% Ca, 14-18% Mn, 53-59% Si. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carloads	15.50c.	16.00c.	18.05c.
Ton lots	16.50c.	17.35c.	19.10c.
Less ton lots.	17.00c.	17.35c.	19.60c.

Calcium Metal

Eastern zone contract prices per lb. of metal, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. Add 0.9c. for Central Zone; 0.49c. for Western Zone.

	Cast	Turnings	Distilled
Ton lots	$1.80	$2.30	$5.00
Less ton lots..	2.30	2.80	5.75

Chromium—Copper

Contract price per lb. of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi River. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2c. for spot sales.

Shot or ingot ..... 45c.

Ferroboron

Contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	$1.20	$1.2075	$1.229
Less ton lots..	1.30	1.3075	1.329

Manganese—Boron

Contract prices per lb. of alloy, f.o.b. shipping point, freight charges allowed. Add 5c. for spot sales.

75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	$1.89	$1.903	$1.935
Less ton lots..	2.01	2.023	2.055

Nickel—Boron

Spot and contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination.

15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

	Eastern Zone	Central Zone	Western Zone
11,200 lb. or more ...	$1.90	$1.9125	$1.9445
Ton lots	2.00	2.09125	2.0445
Less ton lots..	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, Standard grade lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa. York, Pa., per lb. contained tungsten, 10,000 lb. or more.... $1.90

Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.

Open hearth	$2.70
Crucible	$2.80
Primos	$2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal..... $1.50

Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5..... $1.10

Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)

Carload lots	25c.
2000 lb. to carload.....	26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)

Carload lots	58c.
2000 lb. to carload.....	59c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis

No. 1	87.5c.
No. 6	60c.
No. 79	45c.

Bortram, f.o.b. Niagara Falls

Ton lots, per lb.....	45c.
Less ton lots, per lb.....	50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb.

2000 lb. lots	$2.25
Under 2000 lb. lots.....	$2.30

Ferrotitanium, 40-45%, 0.10%C. max. f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained Ti.. $1.23
Less ton lots..... $1.25

Ferrotitanium, 20-25%, 0.10%C. max., ton lots, per lb. contained titanium $1.35
Less ton lots..... $1.40

High-carbon ferrotitanium, 15%-20%, 6-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y. freight allowed East of Mississippi River, north of Baltimore and St. Louis, per carload.....$142.50

Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton..... 58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo. 95c.

Calcium molybdate, 40-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo. ..... 80c.

Molybdenum oxide briquets, 48-52% Mo. f.ob. Langeloth, Pa. per lb. contained Mo..... 80c.

Molybdenum oxide, in cans, f.o.b Langeloth and Washington, Pa. per lb. contained Mo..... 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales

Carload lots	14c.

Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per lb. of alloy

Carload, bulk	4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 5.75c.
Ton lots ..... 7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.

Car lots	8.00c.
Ton lots	8.75c.
Less ton lots	9.25c.

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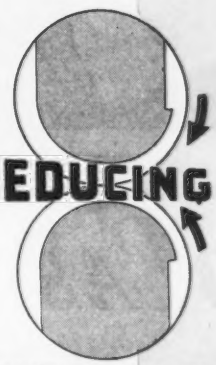
Rockrite Rolled Tubing is made by a process totally different from familiar cold-drawing methods of sizing seamless tubing. By the Rockrite method the tube walls are *compressed and rolled* to correct size, insuring greater concentricity, less ovality. And far closer tolerances—half or less than half those of conventional cold-sized tubing.



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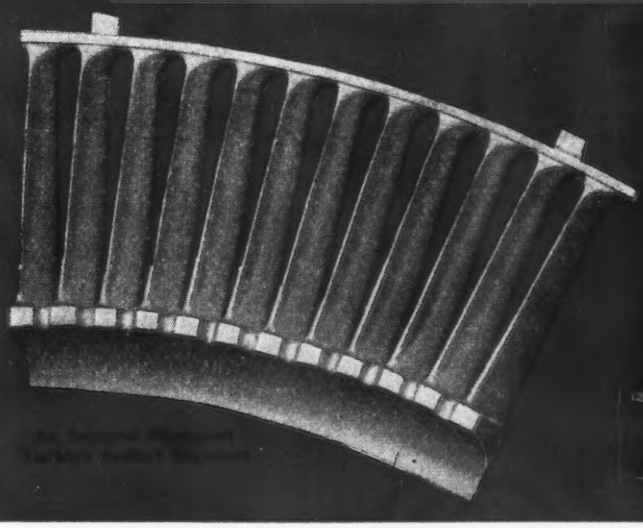

*VITALLIUM
A non-machineable alloy

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